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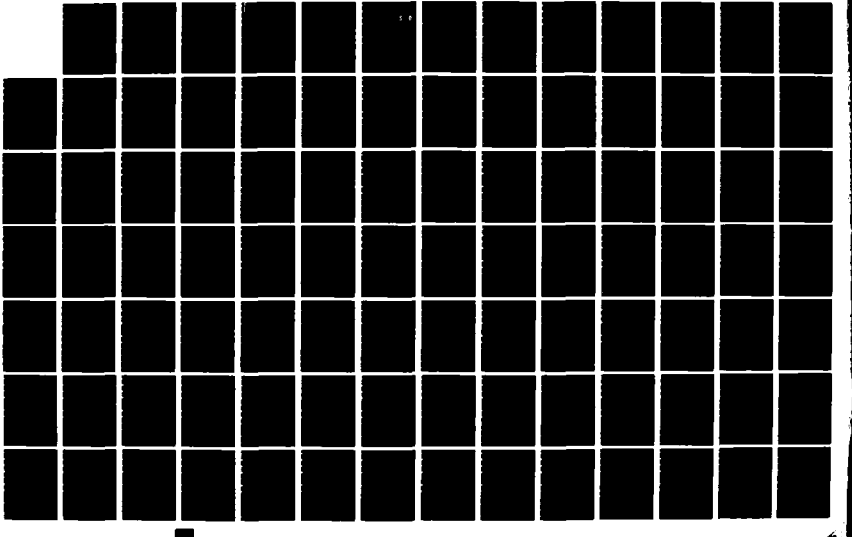

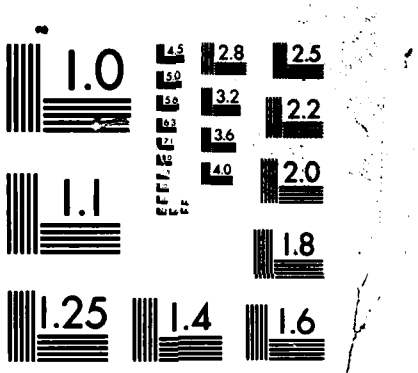

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UNITED STATES AIR FORCE

SUMMER FACULTY

RESEARCH PROGRAM

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Major Amos Otis, Program Manager	(202) 767-4970	XOT

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TR-86-0138

I. INTRODUCTION

Universal Energy Systems, Inc. (UES) was awarded the United States Air Force Summer Faculty Research Program on August 15, 1984. The contract is funded under the Air Force Systems Command by the Air Force Office of Scientific Research.

The program has been in existance since 1978 and has been conducted by several different contractors. The success of the program is evident from its history of expansion since 1978.

The Graduate Student Summer Support Program (GSSSP) is conducted as part of the Summer Faculty Research Program.

The program provides opportunities for research in the physical sciences, engineering, life sciences, business, and administrative sciences. The program has been effective in providing basic research opportunities to the Graduate Students of universities, colleges, and technical institutions throughout the United States.

The program is available to Graduate Students enrolled in either Masters Degree or Doctorate Programs. It has proven especially beneficial to the students who are starting their academic research programs.

Beginning with the 1982 program, research opportunities were provided for 17 graduate students. The 1982 pilot student program was highly successful and was expanded in 1983 to 53 students; there were 84 graduate students in the 1984 program.

In the previous programs, the graduate students were selected along with their professors to work on the program. For the 1985 program, the graduate students were selected on their own merits. They were assigned to be supervised by either a professor on the program or by an engineer at the Air Force Laboratories participating in the program. There were 92 graduate students selected for the 1985 program.

A pilot program for Graduate Student Summer Research via the AFOSR Summer Faculty Research Program (SFRP) was initiated by contract modification on 26 March 1982. The program was developed as an adjunct effort to the SFRP. Its purpose is to provide funds for selected graduate students to work at appropriate Air Force laboratories or centers with supervising professors who hold concurrent SFRP appointments.

For the 1985 GSSSP, emphasis was placed on selecting graduate students to be placed with either supervising professors on the SFRP or with the Air Force laboratory/center engineers. There were 120 GSSSP applicants. A total of 92 graduate students were selected to participate in the 1985 program.

AFOSR-TR- 86-0138

UNITED STATES AIR FORCE

SUMMER FACULTY RESEARCH PROGRAM

1985

PROGRAM MANAGEMENT REPORT

UNIVERSAL ENERGY SYSTEMS, INC.

Program Director, UES
Rodney C. Darrah

Program Administrator, UES
Susan K. Espy

Program Manager, AFOSR
Major Amos L. Otis

Submitted to

Air Force Office of Scientific Research

Bolling Air Force Base

Washington, DC

December 1985

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I. INTRODUCTION

Universal Energy Systems, Inc. (UES) was awarded the United States Air Force Summer Faculty Research Program on August 15, 1984. The contract is funded under the Air Force Systems Command by the Air Force Office of Scientific Research.

The program has been in existance since 1978 and has been conducted by several different contractors. The success of the program is evident from its history of expansion since 1978.

The Summer Faculty Research Program (SFRP) provides opportunities for research in the physical sciences, engineering, life sciences, business, and administrative sciences. The program has been effective in providing basic research opportunities to the faculty of universities, colleges, and technical institutions throughout the United States.

The program is available to faculty members in all academic grades: instructor, assistant professor, professor, department chairman, and research facility directors. It has proven especially beneficial to young faculty members who are starting their academic research programs and to senior faculty members who have spent time in university administration and are desirous of returning to scholarly research programs.

Beginning with the 1982 program, research opportunities were provided for 17 graduate students. The 1982 pilot student program was highly successful and was expanded in 1983 to 53 students; there were 84 graduate students in the 1984 program.

In the previous programs, the graduate students were selected along with their professors to work on the program. For the 1985 program, the graduate students were selected on their own merits. They were assigned to be supervised by either a professor on the program or by an engineer at the Air Force Laboratories participating in the program. There were 92 graduate students selected for the 1985 program.

Follow-on research opportunities have been developed for a large percentage of the participants in the Summer Faculty Research Program in 1979-1983 period through an AFOSR Minigrant Program.

On 1 September 1983, AFOSR replaced the Minigrant Program with a new Research Initiation Program. The Research Initiation Program provides follow-on research awards to home institutions of SFRP participants. Awards were made to approximately 50 researchers in 1983. The awards were for a maximum of $12,000 and a duration of one year or less. Substantial cost sharing by the schools contributes significantly to the value of the Research Initiation Program. In 1984 there were approximately 80 Research Initiation awards.

For the 1985 program, the amount of the Research Initiation Program was increased to a maximum of $20,000. Cost sharing by the Universities for the program was encouraged. There will be approximately 80 Research Initiation awards following the 1985 Summer Program.

II. RECRUITING AND SELECTION

The program is conducted on a nationally advertised and competitive selection basis. Advertising for the 1985 program was conducted via direct mail to all accredited schools. The mailing was sent to the department chairman at the schools. The departments included biology, genetics, ecology, entomology, chemistry, computer science, graphics, mathematics, physics, aeronautical engineering, ceramic engineering, chemical engineering, materials science, mechanical engineering, electrical engineering, metalurgy, nuclear science, and psychology. The brochures were also mailed to all of the participants in the 1984 program. Brochures were mailed to the Presidents of Historically Black Colleges. The brochures were sent to all participating USAF laboratories/centers; distribution was made through AFROTC units on university campuses; information was supplied to all who made requests. Overall, more than 7500 brochures were distributed throughout the country.

In 1979, 70 faculty members participated. In 1980 and 1981, 87 faculty members participated each year; 91 faculty and 17 students participated in the 1982 program. In 1983, 101 faculty and 53 students participated. In the 1984 program there were 152 faculty members and 84 graduate students appointed to the Air Force facilities. For the 1985 program, 154 faculty members and 92 graduate students were assigned to the Air Force laboratory/centers.

Application deadline was February 1, 1985. There were over four (4) applications received for each position available on the 1985 Summer Faculty Research Program. The selection panels met in February. The announcements of selections were mailed on March 1, 1985. In total 174 offers of position were made for the Summer Faculty Research Program, with 154 professors accepting appointments.

III. PRE-SUMMER VISIT (Optional)

Each Summer Fellow was directed to contact the designated representative at the laboratory/center of assignment to discuss a pre-summer visit. The purpose of the pre-summer visit is basically threefold: 1) to meet with laboratory personnel, especially the Effort Focal Point with whom the Summer Fellow would be working most closely, and to become personally acquainted with the laboratory facilities; 2) to finalize and formalize objectives for the Summer Fellow's summer research period and report these to UES; 3) to make arrangements for lodging for the research period. The focus of this visit was on making sufficient preparations so that the ten week summer research effort would be effective.

IV. GRADUATE STUDENT SUMMER SUPPORT PROGRAM (GSSSP)

A pilot program for Graduate Student Summer Research via the AFOSR Summer Faculty Research Program (SFRP) was initiated by contract modification on 26 March 1982. The program was developed as an adjunct effort to the SFRP. Its purpose is to provide funds for selected graduate students to work at appropriate Air Force laboratories or centers with supervising professors who hold concurrent SFRP appointments. During the 1984 program, 84 graduate students representing 42 schools and 20 disciplines were appointed from 112 applicants.

For the 1985 GSSSP, emphasis was placed on selecting graduate students to be placed with either supervising professors on the SFRP or with the Air Force laboratory/center engineers. There were 120 GSSSP applicants. A total of 92 graduate students were selected to participate in the 1985 program.

The 1985 GSSSP report is published as three separate documents under the 1985 Summer Faculty Research Program and are entitled, Graduate Student Summer Support Program Management Report and Technical Reports, Volume I and II, October 1985.

V. SITE VISITS

Visits listed below include those by UES and AFOSR personnel. The faculty, USAF research colleagues, and student participants are generally satisfied with the program. Criticisms were: a) too much paper work to administor program, b) housing difficult to find, c) delays experienced in receiving payment d) 10 weeks too short for research period.

Nov. 4, 1984	Rome Air Development Center Griffis Air Force Base, New York
Nov. 5 & 6, 1984	Geophysics Laboratory Rome Air Development Center Electronics System Division Hanscom Air Force Base, Massachusetts
Nov. 12, 1984	Human Resources Laboratory Williams Air Force Base, Arizona
Nov. 13, 1984	Weapons Laboratory Kirtland Air Force Base, New Mexico
Nov. 14, 1984	Frank J. Seiler Research Laboratory United States Air Force Academy, Colorado
Nov. 15-18, 1984	USAF School of Aerospace Medicine Occupational & Environmental Health Laboratory Human Resources Laboratory USAF Aerospace Medical Division Brooks Air Force Base, Texas

Nov. 19, 1984	Logistics Management Center Gunter AFS, Alabama and Leadership and Management Development Ctr. Maxwell AFB, Alabama
Dec. 6, 1984	Armament Laboratory Eglin Air Force Base, Florida
Dec. 7, 1984	Engineering and Services Center Tyndall Air Force Base, Florida
Dec. 11, 1984	Rocket Propulsion Laboratory Edwards Air Force Base, California
April 6, 1985	Air Force Office of Scientific Research Bolling Air Force Base, DC
Feb. 18-22, 1985	Selection Meeting Brooks Air Force Base, Texas
June 16, 1985	Geophysics Laboratory Electronics Systems Division Rome Air Development Center Hanscom Air Force Base, Massachusetts
June 18, 1985	Rome Air Development Center Griffis Air Force Base, New York
July 15, 1985	Human Resources Laboratory Williams Air Force Base, Arizona
July 16, 1985	Weapons Laboratory Kirtland Air Force Base, New Mexico
July 18, 1985	Frank J. Seiler Research Laboratory United States Air Force Academy, Colorado and Human Resources Laboratory Lowry Air Force Base, Colorado
July 19, 1985	School of Aerospace Medicine Human Resources Laboratory Occupational & Environmental Health Laboratory Brooks Air Force Base, Texas
July 22, 1985	Rocket Propulsion Laboratory Edwards Air Force Base, California

July 30, 1985	Logistics Management Center Gunter AFS, Alabama and Leadership and Management Development Ctr. Maxwell AFB, Alabama
April 1, 1985	Armament Laboratory Eglin Air Force Base, Florida
August 2, 1985	Engineering and Services Center Tyndall Air Force Base, Florida

Because of the proximity of UES to Wright-Patterson Air Force Base, several site visits were made to the following laboratories:

Aerospace Medical Research Laboratory
Aero Propulsion Laboratory
Avionics Laboratory
Business Research Management Center
Flight Dynamics Laboratory
Human Resources Laboratory
Logistics Command
Materials Laboratory
Wright-Patterson Air Force Base, Ohio

We find that the objectives of the SFRP are being well served. SFRP Research Fellows indicate that they are performing independent research, and are not being used as "summer help". There are some misconceptions by research colleagues and summer fellows concerning the purpose of the program; one misconception is that the program is suitable for repeated research efforts by an individual. However, in this program we have found no abuse of the non-personal services requirements. As expected, enthusiasm is high for the possibilities of follow-on funding by AFOSR at the home university. Research fellows often conduct lectures and seminars at the Air Force locations.

As a record of the documentation supplied to the appointees, the UFS Information and Appointment Packets are provided in Appendix I of this report.

VI. HISTORICALLY BLACK COLLEGES/UNIVERSITIES (HBCU's) WORKSHOP

In conjunction with the Summer Faculty Research Program, and as part of the UES EEO/Affirmative Action Program, UES sponsored an AFOSR workshop at the NAFEO (National Association for Equal Opportunity in Higher Education) Conference. The workshop was held on April 3 and 4, 1985. The AFOSR six Scientific Directories presented information to acquainted Faculty/Researchers from HBCU's with the opportunities and strategies for participation in basic research programs of AFOSR. UES provided funding for 40 participants from HBCUs to attend the workshop.

The overall evaluation of the Conference by the participants was very favorable. There was great appreciation for the opportunity to interact with the AFOSR Scientific Directors and Program Managers, and successful AFOSR grantees from the black colleges. Many participants commented that the Workshop format, as well as the information presented, was very beneficial. There were many requests for copies of the various presentations which have been forwarded by NAFEO to the respective presenters.

APPENDIX I

This appendix presents the following documents which were distributed to appointees and other program participants.

A. Information Brochure for Summer Fellows.

B. Questionnaire for participants and a summary of their replies.

C. Questionnaire for Air Force laboratory representative and a summary of their responses.

APPENDIX 1.A

INFORMAION BROCHURE

for

SUMMER FELLOWS

on the

1985 USAF-UES SUMMER FACULTY RESEARCH PROGRAM

March 1985

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I. SUMMER FELLOW OBLIGATIONS

Universal Energy Systems, Inc. (UES) is required by contract to impose certain obligations on you in your status as a Summer Fellow. This section outlines those obligations, and you should read them thoroughly. Your are required to sign and return the statement of understanding before the final processing of your appointment can be completed. The following is a list.

1. Pre-Summer Visit: A pre-summer visit to your research location is optional but has been of great value to previous participants in planning the summer research effort. Approval for such a trip may be granted upon written request to UES along with the written concurrence of the Laboratory/Center respresentative. The purpose of this visit is to enable you to make your final plans for the summer research period if needed. Reimbursement is paid for allowable travel expenses incurred on a pre-summer trip as indicated in the Allowable Travel Expenses section (page 3) of this brochure. To be reimbursed, you must invoice for it as described in the Instructions for Invoicing for Compensation and Reimbursement section (page 5) of this brochure.

2. Research Goals and Objectives: A statement of research objectives must be provided to UES PRIOR TO the start of the summer research period. It should outline your goals and the approach you intend to follow in researching these goals. Neither travel expenses nor expense allowances will be reimbursed until after receipt of your statement of research objectives. The report should also clearly indicate the date of your first working day of the summer research period.

3. Final Report: At the end of your summer research effort, you are required to submit to UES a completed, typewritten scientific report stating the objectives of the research effort, the approach taken, results, and recommendations. Information on the required report format will be sent to you with a "FINAL REPORT INFORMATION BULLETIN" and sample report illustrating a suggested format. The final report must first be approved by your Effort Focal Point and then transmitted so as to reach UES by Monday September 30, 1985. Payment of "Compensation" for the final two weeks of your ten-week research period cannot be made until UES has received and approved this report in the required format.

4. Program Evaluation Questionnaire: You will be sent a critique form to complete near the end of your research period regarding your impressions of the program. This critique form should be completed and returned to UES, along with your final report, by Monday, September 30, 1985. The return of this form is a program requirement; it also must

be received by UES before the final compensation payment can be made.

5. U.S. Air Force - Summer Fellow Relationship: The U.S. Air Force and UES understand and agree that the services to be delivered by Summer Fellows under this contract will be non-personal services and the parties recognize and agree that no employer-employee or master-servant relationships will exist between the U.S. Air Force and the Summer Fellows. Non-personal services are defined as work performed by an individual who is responsible for an end item, such as a report, free of supervision of the U.S. Air Force and free of an employer-employee relationship.

As a Summer Fellow, you will not:

(a) Be placed in a position where you are appointed or employed by a Federal Officer or are under the supervision, direction, or evaluation of a Federal Officer, military or civilian.

(b) Be placed in a staff or policy-making position.

(c) Be placed in a position of command, supervision, administration, or control over Air Force military or civilian personnel or personnel of other contractors or become a part of the U.S. Air Force organization.

The services to be performed under the SFRP do not require UES or the Summer Fellow to exercise personal judgement and discretion on behalf of the U.S. Air Force; rather, the Summer Fellows will act and exercise personal judgement and discretion on their research programs on the SFRP conducted by UES.

The Air Force will have unrestricted use of and access to all data developed during the period of this appointment.

II. ALLOWABLE TRAVEL EXPENSES

If you live outside of the area where you will be assigned for the summer program, the SFRP provides potential funding for two trips between your home and your assigned research location. As soon as you have signed and returned your appointment letter along with the budget sheet, you will be authorized to receive reimbursement for travel expenses as described below.

As outlined in the Summer Fellow Obligations section in this brochure, you may make a pre-summer visit in addition to the trip to and from your assigned research location for your summer effort. You are expected to make your own arrangements for these trips, and after the trips you may invoice UES for reimbursement of allowable expenses in the format described in the Instructions for Invoicing for Compensation and Reimbursement section of this brochure. Closely coordinate your travel plans with your EFFORT FOCAL POINT.

All travel reimbursements under Summer Fellow appointments are made according to current UES policy, and deviations from the approved budget are not authorized and will not be reimbursed. In light of these restrictions, you may choose either to travel by common carrier at coach rates or less, by driving your private auto, or by a combination of both. (Please note that funding for rental cars requires ADVANCED WRITTEN approval by UES and UES will not reimburse this expense unless the prior written approval is obtained.) With any of these choices you may claim reimbursement up to the amount for the most direct routing, taking into the account the desirability of routing on interstate highways if you drive your private auto.

Reimbursement for direct route travel by common carrier will be paid on your submission of an invoice to UES following the invoicing instructions referenced above. In the view of the convenience of having a car at the research location, UES strongly recommends that a private auto be used for travel when practical. Reimbursement when you drive your private auto is at the rate of 20¢ per mile within the above routing restrictions and will be paid on submission of a suitably prepared invoice. These reimbursements cannot be extended to cover travel by your family if they accompany you on either of these authorized trips.

During the pre-summer visit, you will be authorized to claim a per diem reimbursement at the rate of $50.00 per day for a maximum of three days spent at your assigned research location outside of your area of residence. Instructions for claiming this per diem are also described in the Instructions for Invoicing for Compensation and Reimbursement section of this brochure.

During the ten week summer research period, you will be authorized to receive an expense allowance in lieu of a per diem payment at a rate of $37 per day for a maximum of 70 days. To receive this allowance, you must invoice for it and be living outside your area of residence.

These items above are the only reimbursable travel allowances authorized under the SFRP appointment. Any additional travel expenses incurred during the appointment period will be your personal responsibility.

III. INSTRUCTIONS FOR INVOICING FOR COMPENSATION AND REIMBURSEMENT

Attached is a copy of the Invoice Format that you are required to use to obtain compensation or reimbursement from UES. Note that all disbursements by UES for compensation, travel, and/or other expenses are subject to audit approval, so you must submit receipts substantiating charges invoiced.

In addition, you must prepare, sign, date and attach to each completed invoice a Brief Report of Effort

A. PREPARATION OF BRIEF REPORT OF EFFORT

Whenever you submit an Invoice for reimbursement to UES you must also include a brief report describing your activities for the invoice period. To meet this obligation, you must prepare, date, sign, and attach to your completed invoice a Brief Report of Effort describing the research accomplished on the appointment and explain any travel during the invoice period.

This report should describe innovative techniques and designs or discoveries which may be disclosed as patents. Rights to any inventions or discoveries shall reside with UES unless determined otherwise by the contracting agency.

The Brief report should never exceed one typewritten page and most often should be considerably shorter than one page.

B. PREPARATION OF INVOICE FORMAT

The financial items required on the Invoice Format are for COMPENSATION, TRAVEL, EXPENSE ALLOWANCE, AND PER DIEM.

Item (1) SOCIAL SECURITY/MAILING ADDRESS

Fill in your name, social security number, and address to which you wish to have your check mailed.

Item (2) COMPENSATION

(a) Indicate the dates for which you are claiming compensation, and indicate the number of days you are claiming for compensation.

(b) Multiply this number by $110.00 and enter the total dollar amount in the blank total charges for service. The accumulated total number of days you claim on this appointment may not exceed the number authorized in your appointment letter.

Item (3) TRAVEL

(a) Under the heading Date indicate the date you departed on your trip and the date you arrived at your destination. If you are invoicing for a round trip, also list the date you departed on your trip and the date you arrived home.

(b) Under the heading Dept/Arrival Time list the departure and arrival times for the corresponding days you listed under Date.

(c) List your destination under the heading Destination.

(d) Under the heading Mode, indicate your principal means of conveyance; i.e., commercial air, private auto, etc

(e) Under the heading Amount, itemized these expenditures for travel reimbursement. Continue them on a separate sheet if necessary.

(f) Total these travel items and enter the dollar amount for travel in this invoice on the line to the right of Total Travel Expense.

Item (4) EXPENSE ALLOWANCE

This item on the invoice will be used to claim the $37 per day for reimbursement of costs incurred at your assigned research location.

(a) In the first blank to the right of EXPENSE ALLOWANCE enter the number of days for which you are claiming the expense allowance at your assigned research location.

(b) Multiply this number by the daily allowance rate of $37.00 and enter this total dollar amount in the blank at the far right.

(c) Itemize the days for which you are claiming the Expense allowance reimbursement. It can include weekend days and holidays as well as regular work days. It does not apply to the pre-summer visit.

Item (5) PER DIEM

This item will be used to claim reimbursement only for Per diem charges on the optional pre-summer visit. This cannot exceed three days; only days spent at the actual research site are allowed.

(a) In the first blank to the right of PER DIEM enter the number of days reimbursement being requested. This entry must correlate with an accompanying lodging receipt.

(b) Multiply this number by the $50.00 daily Per diem rate and enter the total dollar amount in the blank at the far right.

Item (6) TOTAL

Total items 3 + 4 + 5.

Item (7) INSTRUCTIONS

You may combine reimbursement requests for compensation, travel, and Per diem or expense allowance in the same invoice. The total for all items invoiced should be indicated on the blank labeled "Total Amount of Bill" in the lower right hand side of line 6.

IMPORTANT: Indicate in the space provide on each invoice the address to which you want the check mailed.

You must sign and date your invoice in the lower left hand corner as "Summer Fellow" before it is submitted; you MUST also have your Effort Focal Point countersign the invoice before it is mailed to UES Your Effort Focal Point is an Air Force individual at your research location who will be identified prior to your effort start date.

Invoices should be mailed to:

Universal Energy Systems, Inc.
SFRP Office
4401 Dayton-Xenia Road
Dayton, Ohio 45432

IV

BILL FOR SERVICE

1. _____ _____
Name (First, Initial, Last) Social Security #

_____
Address (Street, City, Zip)

SERVICE: SFRP Summer Fellow

SERVICE AUTHORIZED BY: Rodney C. Darrah RATE AUTHORIZED: $110/day

This service is for:

Government Contract: Project # 760

Government Contract No. F49620-85-C-0013

2. DATES OF SERVICE: _____ TOTAL DAYS OF SERVICE _____

TOTAL CHARGES FOR SERVICE: _____

ADDITIONAL ITEMIZED REIMBURSABLE EXPENSES: (receipts required for expenditures over $25.00)

3. TRAVEL: DATE _____ DEPT/ARRIVAL TIME _____

DESTINATION MODE _____ AMOUNT _____

4. EXPENSE ALLOWANCE: (_____ days @ $37.00/day) $_____

5. PER DIEM: (_____ days @ $50.00/day) (Pre Summer Visit) $_____

6. TOTAL ADDITIONAL EXPENSE: _____

7. TOTAL AMOUNT OF BILL: _____

_____ _____
Summer Fellow Signature - Date Telephone

Invoice Approval: _____
Effort Focal Point Signature

X_____ Brief Report of Effort Attached _____
Type or Print Name

Location: _____

Telephone: _____

Date: _____

Send bill to:
UNIVERSAL ENERGY SYSTEMS, INC.
ATTN: SFRP Office
4401 Dayton-Xenia Road
Dayton, Ohio 45432

V
FOLLOW-ON RESEARCH POSSIBILITIES

As you are aware, the Air Force Office of Scientific Research sponsors the Summer Faculty Research Program. As a companion program intended to encourage further research work with the Air Force, AFOSR also sponsors the Research Initiation Grant Program. All Summer Fellows who have participated in the Summer Faculty Research Program are encouraged to apply for this valuable program. The Research Initiation Program is also administered by UES.

To compete for a Research Initiation Program award, SFRP participants must submit a complete proposal and proposed budget either during or promptly after their SFRP appointment period. The maximum award under the Research Initiation Program is $20,000 plus cost-sharing up to a matching total amount. The total funds available limit the number of awards to approximately 75, or half the number of 1985 SFRP participants.

The mechanics of applying for a Research Initiation Program award are as follows:

(1) Research Initiation Program proposals of $20,000 plus cost-sharing must be submitted after August 1, 1985 but no later than November 1, 1985. Proposals should be closely coordinated with the SFRP Effort Focal Point, relate to the SFRP effort and have strong prospects for later sustained funding by the Air Force Laboratory/Center.

(2) Proposals are evaluated and a final award decision is recommended by AFOSR after consultation with the Laboratory/Center.

(3) Awards will then be negotiated with the employing institution designating the individual as Principal Investigator, with the period of award having a start date no earlier than September 1, 1985 and a completion date no later than December 15, 1986.

(4) Employing institutions are encouraged to cost-share since the program is designed as a research inititation procedure. Budgets must include, where applicable, Principal Investigator time, graduate assistance and support effort, equipment and expendable supplies, travel and per diem cost, conference fees, indirect costs, and computer charges.

APPENDIX 1.B

PARTICIPANT'S QUESTIONNAIRE & REPLY SUMMARY

1985 USAF/UES SUMMER FACULTY RESEARCH PROGRAM
EVALUATION QUESTIONNAIRE

(TO BE COMPLETED BY PARTICIPANT)

Name_____Title_____

Dept. (at Home)_____Home Institution_____

Research Colleague_____

Laboratory Address of Colleague_____

Brief Title of Research Topic_____

_____

A. TECHNICAL ASPECTS

1. Was the offer of research assignment within your field of competency and/or interest? YES_____NO_____

2. Did you have a reasonable choice of research assignment? YES____ NO_____
If no, why?_____

3. Was the work challenging? YES_____NO_____. If no, what would have made it so?_____

4. Would you classify your summer effort as research? YES_____NO_____
Comment:_____

5. Were your relations with your research colleague satisfactory from a technical point of view? YES_____NO_____ if no, why?_____
_____
_____

6. Suggestions for improvement of relationship._____
_____
_____

7. Considering the circumstances of a summer program, were you afforded adequate facilities and support? YES_____NO_____ If no, what did you need and why was it not provided?_____

_____

8. Considering the calendar "window" of ten weeks, limited by various college and university schedules, please comment on the program length. Did you accomplish: more than_____;
less than_____;
about what you expected_____?

9. Do you think that you will continue this or related research efforts upon returning to your home institution by applying for a Mini Grant or other funding? YES_____NO_____ Give a brief explanation of your plans._____

_____

10. Were you asked to present seminars on your basic expertise of work? YES_____NO_____ Please list number, dates, approximate attendance, length of seminars, title of presentations.

11. Were you asked to participate in regular meetings in your laboratory? YES_____NO_____ If yes, approximately how often? _____

_____

12. Did you perform travel on behalf of the laboratory? YES_____NO_____
Where to?_____
Purpose?_____

13. List any "special" meetings you may have attended or participated in, such as conferences, visiting lectures, etc._____

_____

_____

_____

14. Other comments concerning any "extra" activities._____

_____

_____

15. On a scale of A to D, how would you rate this program?

	A (High) . . . . D (Low)			
Technically challenging	A	B	C	D
Future research opportunity	A	B	C	D
Professional association	A	B	C	D
Enhancement of my academic qualifications	A	B	C	D
Enhancement of my research qualifications	A	B	C	D
Overall value	A	B	C	D

B. ADMINISTRATIVE ASPECTS

1. How did you first hear of this program?_____
_____

2. What aspect of the program was the most decisive in causing you to apply?_____
_____

3. Considering the time of year that you were required to accept or reject the offer, did this timetable cause you any problems of commitment? YES_____NO_____

4. After your acceptance, was the information on housing, location, directions, etc. supplied to you prior to the summer period satisfactory? YES_____NO_____

5. Did you have any difficulty in any domestic aspects such as, locating suitable housing, acceptance in community, social life, any other "off-duty" aspects? YES_____NO_____ If yes, please explain._____
_____
_____

6. How do you rate the stipend level? Meager_____Adequate____ Generous_____.

7. How important is the expense-paid pre-program visit to the work site? Not worth expense_____Convenient_____Essential_____. Please add any other comments you may have._____

_____

_____

8. Please give information on housing: Did you reside in apartment_____, VOQ_____, other (specify)_____? Name and address of apartment complex and manager's name._____

_____

9. Please suggest names and give sources, of organizations, mailing lists or other information you think would be helpful in advertising next year's program._____

_____

10. Do you believe the Graduate Student Program increased the effectiveness of this program? YES_____NO_____.

11. Did a student work with you? YES_____NO_____ If so, please comment on the Graduate Student Support influence on your summer research._____

_____

12. Considering the many-faceted aspects of administration of a program of this magnitude, how do you rate the overall conduct of this program? Poor_____Fair_____Good_____Excellent_____. Please add any additional comments._____

_____

_____

13. Please comment on what, in your opinion, are:

a. Strong points of the program:_____

_____

_____

_____

b. Weak points of the program:_____

_____

_____

_____

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14. On balance, do you feel this has been a fruitful, worthwhile, constructive experience? YES_____NO_____

15. Other remarks:_____

_____

_____

_____

_____

_____

_____

THANK YOU

QUESTIONNAIRE EVALUATION SUMMARY
(Participant)

1. Assignment in field of competency and/or interest? Yes - 152
No -

2. Reasonable choice of assignment? Yes - 144
No - 8

If no, why?

Limited number of approved projects.

I was assigned to assist with previously designated assignments in an ongoing project.

On my pre-assignment visit, only one problem was shown to me.

I was not interested in other choices.

Subject of research was pre-determined.

Because the purpose of the program were not well understood by the research colleague.

This was the only research topic suggested to me.

None offered.

It was mutually agreed to before the assignment.

3. Work challenging? Yes -150
No - 2

If no, why?

Better if laboratory had been operational at the beginning.

Simple electronic parts could not be obtained due to ridiculous, ineffective, inefficient procurement system.

4. Would you classify your summer effort as research? Yes - 150
No - 2

Comments:

Yes
Included primary data collection by interview technique.

Excellent and challenging research environments.

Research included development of hidden line algorithm.

I would have appreciated more direct work with Air Force technology.

It was a good learning experience.

Standard basic research, publishable in standard journals. Involved academic type topics: Chemical Kinetics; Isotope Effects; Activation Parameters; Reaction Mechanisms.

Excellent; particularly since I was in my 2nd year.

Applied research.

It was partly applying statistical methodologies and partly learning the basic theory of classification.

It was library research and consultation with other scientists rather than laboratory research.

Mainly, the literature review part of research. Experimentation was curtailed due to lack of parts.

Literature Review and Project Proposal.

I did original research on satellite data.

Work with graduate students will produce three MS theses.

Primarily investigative.

It was a period of learning for me, and I hope I accomplished some tasks that the group had been needing.

Ability to devote 100% time to research only was very welcomed.

It was a combination of research and experimental testing of a system at an early stage of development. However, this has stimulated ideas for further research.

Library searches and article reviews are a part of research but Natural Scientists tend to consider research in the main as a laboratory investigation activity.

The Final Report is very indicative of the research carried out. A large quantity of data was obtained.

Library searches and articles reviews are a part of research but natural scientists tend to consider research, in the main, as a laboratory investigation activity.

No
Involved the analysis of an existing system.

Some aspects were; others were cleary not so.

Work involved the development of new materials.

It involved a sparsely tested application to molecular spectroscopy.

5. Were your relations with colleagues satisfactory? Yes - 149
No - 3

If no, why?

Discussions were good but lack of experimentation limited work to immerse proportions.

Because of misunderstandings about the goals of the program and an approach which indicated a desire for an employer-employee relationship.

My colleague seemed to be heavily burdened with deadlines in dealing with his regular responsibilties and found limited time for interaction. I lack a reading on his assessment of my effort but feel that he viewed my abilities as unsatisfactory. Nevertheless, I feel that I immersed myself into the topic and found it a challenge.

6. Suggestions for improvement of relationships.

Clarification of my role in the lab, along with the role of other branch personnel.

More information should be presented in the program brochure concerning the specific involvements of each of the participating Air Force locations.

More opportunities for contact.

Maybe have weekly stand up review of all involved in project.

Excellent!

Frequent seminars.

Better procurement system and well equipped labs.

None - it could not have been better.

We had a good relationship; therefore, no suggestions for improvement.

Greater speed and flexibility in ordering materials.

Regularly scheduled conferences/meetings to interchange ideas. His schedule was so busy that these meetings were too infrequent and hurried.

None - the relationship was most amicable and supportive.

Have an open meeting to provide faculty member opportunity to present "other" research efforts.

Excellent relationship.

Working with Dr. Richard B. Rivir was a pleasure. Could not be better.

Not enough information and communication between the faculty and research colleague are available before coming here.

The relationship could not be improved upon.

Excellent relationship with the people at AEDC.

More frequent informal communication or meetings between summer research fellows and researchers at the host agencies be conducted to exchange ideas and/or feedback.

Everything went extremely well, thus I have no suggestions.

Contact earlier in the academic year to discuss projects of mutual interest.

Make necessary equipment available, such as a typewriter that is in "good repair" rather than one that is more or less a "discard" which no one else uses.

Early contact beyond the pre-summer visit should prove to be very satisfying.

Make clear the goals of the program by a careful, prompt briefing of all research personnel in the research colleague position. Stress that this is not a summer job placement program but a research program.

Colleague was in the midst of moving to California. Try to make sure that the research colleague will be at the Lab for the full term of the project.

He should not travel so much. I would estimate he was absent half the time I was there. When he was at Seiler, he was busy in administration, not science.

Computer software was extremely limited. It needs improvement.

Relationship was just fine.

Little concern shown for desk and office space. At times no desk was available.

In my case things were good. I have heard others mention that they were unable to gain access to their center colleague as well as they would like.

My relationship was excellent so I have no suggestions.

Previous summer experience, resulted in very good relationship.

Possibly more formal research discussions/technical interchange could be planned.

A description of the research project and effort should be sent prior to the researcher arrival for the summer.

Initial contact be made with the Division Chief who be able to provide an overview of all the possible research areas in his division.

I was satisfied with the working relationships which existed.

Give more information on the background of the SFRP Fellow to the research colleague during selection process.

Have regularly scheduled meetings.

The paperwork (contracts, inventories, internal reports) load at the laboratory appears to make unavailable a large fraction of a staff scientist's time for practicing science. The laboratory had a few seminars which might have enhanced idea exchange.

Increase UCCS Graduate student involvement at FJSRL.

It is difficult to improve it since it is already excellent.

More time one-on-one.

More opportunities to meet other SFRP colleagues.

More contact during the early phases of the experiment would have been beneficial.

Earlier contact between focal point and researcher.

Because of laboratory crowding, we were asked to do our work 20 miles from base; yet the second laboratory was three times as crowded as the first.

This was a great match since I worked within a very dynamic research group and enjoyed technical interaction with researchers of varied backgrounds.

More time for preliminary visits.

My relationship with my research colleagues was excellent. We hope to do much research collaborating and publish several scientific papers resulting from the project as time and funds permit.

7. Were you afforded adequate facilities? Yes - 130
No - 22

If no, why?

Preferred to have a x-ray topographic camera instead of a four cycle diffractometer to do rocking curve analysis.

I would have liked to work in the evenings also, but for security reasons I had to leave the building at 4:30. I suggest that a nonsecure room with some computer terminals be provided so that we may do computer work in the evenings.

Research facilities were poor partly because of a recent lab move.

Single electronic parts were needed. The procurement system of the base is a bureacrat's dream, a researchers nightmare.

Desk with drawer space, file cabinet, and bookshelf, access to a telephone with an outside line. These problems were a result of building renovations and are understandable.

Since my problem was development of a numerical model, lack of access to the main computer because of clearance was a problem.

Needed a way to purchase needed chemicals - time frame of supply does not allow purchase of needed materials.

Clerical personnel, in general seemed to have resented being asked for clerical support, and the typewriter which was made available for the participant to do her own typing was more of a "discard" which made routine typing a drudgery rather than a smooth operation.

Computer terminal was not available for most part of my stay.

Need priority for apparatus in order to get project started early. Never got to dye laser spectrometer.

Instrumentation was available but technical assistance and support was rather inadequate and frustrating and not timely-inhibited progress.

Could not get access to mainframe computers because of lack of security clearance.

8. Accomplishment in ten weeks? More than expected - 27
Less than expected - 27
About what expected - 98

9. Will you continue this or related research efforts? Yes - 144
No - 8

10. Were you asked to present seminars? Yes - 62
No - 90

11. Were you asked to participate in meetings? Yes - 75
No - 77

12. Did you travel on behalf of the laboratory? Yes - 16
No - 136

13. Did you participate in "special" meetings? Yes - 35
No - 117

14. Please give other comments on extra activities.

There should be funding available for "extra" activities.

I talked regularly with branch personnel, to learn as much as possible from this experience.

Were given a history and tour of the base.

From participation in the AAAS/EPA Summer Fellowship Program I feel the contractor will have to arrange the seminars - best propects are for the Fellows themselves or invited speakers to present for our group. Our colleagues could be invited to attend.

Invited to participate in intramural and social activities.

Opportunities to discuss work of others in my section.

Additional funds should be provided (or made available) for attending a professional meeting or conference because most professional meetings are being held in summer months.

Several informal discussions (involving 5 or 6 people) on heat transfer theory.

Opportunities for cooperative research with staff members at Los Alamos National Laboratory, Sandia National Laboratory, EG&G Measurement Systems, Air Force Weapons Laboratory, and Frank J. Seiler Research Laboratory.

The "extra" activities are of cource the element that can make the difference between a good summer project and a great one. It is difficult for the lab, since in many cases they do not know what the fellows interests are, to set up a formal program. However, it might help to have a menu of activities to review and choose from.

I would have liked to meet with other summer faculty. I also would have liked a tour of the center.

Touring of the crew technology division, meeting on the predictability of personality subscale of the basic attributes test (HRL) and its alternative strategies. Meeting of AISFRP and UES personnel on July 19, 1985.

Had a chance to interact with colleagues from Wright State and the University of Dayton.

UES sponsered overview of SAM and party to meet fellow faculty.

Had one meeting at which I presented the results of my study.

I will present a paper on the preliminary results of this research this fall at an astronomical meeting.

Was able to teach a course at a graduate extension center on campus.

I was included in and welcomed to all social gathering.

Was able to provide discussion and materials on both graph theory application and artificial intelligence to several individuals other than my immediate research colleague and these were received with strong interest by individuals involved in such use.

Was invited to participate in small group meetings.

Visit to Rocketdyne was very useful in knowing current design of liquid rocket engines and their performance.

Went to several Lab picnics.

Very enjoyed. Luncheons with research colleagues.

Site visit, Hewlett-Packard, Colorado Springs.

It would be intellectually stimulating if each participant in the Summer Faculty program could present a 15 minute "mini-seminar" to discuss the project on which he worked.

A collaborating university scientist visited for a day to discuss results of mutual interest.

Many visitors came through offering excellent opportunities for discussion.

I was shown the aircraft in which field measurements of radiation are made.

Visit the site of the test blasting on RC wall sections.

I participated to AFGL meetings on "get-away-special" planning.

More interactions between base scientific personnel and visiting scientists are needed.

My graduate student and I attended all meetings related to the program. Two major meetings took place over the summer at Brooks Air Force Base.

		A (High) . . .				D (Low)	
15.	Technically challenging?	A- 93	B- 54	C- 5	D-		
	Future research opportunity?	A- 107	B- 38	C- 5	D-	2	
	Professional association?	A- 98	B- 42	C- 12	D-		
	Enhancement of my academic qualifications?	A- 77	B- 57	C- 14	D-	4	
	Enhancement of my research qualifications?	A- 85	B- 54	C- 11	D-	2	
	Overall value?	A- 106	B- 42	C- 4	D-		

B. ADMINISTRATIVE ASPECTS

1. How did you first hear about program?

Colleagues	- 61
Advertisement	- 29
Air Force	- 19
Direct Mail	- 43

2. Decisive aspect of application?

NOTE ON THIS QUESTION, APPLICANTS HAD MORE THAN ONE ANSWER

Area of possible future research funding	- 33
Good research opportunity	- 96
Opportunity to work with USAF	- 21
Location	- 23
Financial support	- 12
Chance of publishable result	- 3
Flexible research schedule	- 2

3. Did the program timetable cause you any problems? Yes - 34
No -118

4. Program information satisfactory? Yes - 132
No - 20

5. Did you have problems in domestic aspects? Yes - 26
No - 126

If yes, explain:

My husband and I found the motels in the area deplorable forcing us to accept a lease or an efficiency apartment that was too small for the two of us.

Hard to be seperated from family.

Family recreation. Perhaps, summer fellows may live in a more concentrated area which may be arranged by UES.

Several faculty members, myself included, were asked to leave the VOQ area the end of our 10 week stay.

If Bentley College had not been available, the expense would have extreme.

I was required to leave the VOQ for three days with very little notice. It should be noted that even a few days in a motel can wipe out the financial advantages of the VOQ compared with an apartment off base. Also, it is very unsettling to realize that at any time you can be required to leave the VOQ and find other quarters. Also, it was never made very clear what base facilities I was allowed to use and under what circumstances. (Officers' club, BX, gym, Commisary, etc.) Since ten weeks living in a strange city can be very hectic and confusing, this information would have been extremely useful.

Summer funds were inefficient to bring my family with me.

I wish the visiting officer quarters (VOQ) would put aside enough rooms for the visiting professors instead of supplying US quarters only with it wasn't filled of the 10 weeks I was at AEDC. I was "bumped" about half the time from VOQ. There is not adequate housing in Tullahoma, and the adequate motels are too expensive, and too far away from research center.

While I found suitable housing, it was not easy. If I could have stayed in the VOQ, it would have been more convenient.

I encountered difficulty in locating housing nearby which would accept children, and that did not require a lease.

It would have been nice to be able to afford to bring my family along.

Difficult to find reasonable housing on short time basis.

Non-availability of apartment on day it was promised - apartment should have been available on June 1, 1985 and it was not ready until June 3, 1985.

Housing was more expensive than I might wish.

Initial experience with two motels (Family Inn and Betsy Ross) were very negative.

Locating housing was an effort.

Housing was hard to find and expensive.

The summer was complicated by a birth in the family and by major renovations in my house.

Tried to arrange housing at VOQ and was unsuccessful.

Housing in the area is hard to find.

Housing is difficult to find for short periods, locations due to remoteness of lab, base facilities not open to civilians.

Some difficulty in finding accomodations.

Housing was a problem. More information is needed.

A certain amount of unnecessary stress resulted from periodic removel from the VOQ to make room for military personnel.

I had difficulty getting into VOQ due to construction. I was forced to make alternate housing arrangements after arriving in Dayton.

Strain of living away from wife.

It was difficult to find acceptable short-term leases near the base.

Certain amount of unnecessary stress resulted from periodic removal from the VOQ to make room for military personnel.

6. Stipend level?

Generous - 9
Adequate - 101
Meager - 42

NOTE, THAT NOT EVERYONE WENT ON A PRE-PROGRAM VISIT

7. Pre-program visit?

Essential	- 101
Convenient	- 37
Not worth expense	- 8
N/A	- 4

8. Housing information:

VOQ	- 26
Apartment	- 58
Other	- 68

9. Mailing list suggestions?

Mechanical Engineering Department, Box 35, Wichita State University, Wichita, KS 67208.

I.E.E.E., S.I.A.M., send brochures to University Departments.

University Grants Administrators.

State University of New York, College at Fredonia Departments of Chemistry; Physics; Biology; Geology; Mathematics as well as other campuses in the State University systems.

An ad in the SIAM Newsletter would reach many applied mathematicians.

Continue to mail information to university departments, or advertise in newsletters of professional organizations, such as the 'Amstat News' of the American Statistical Association.

There is a group in Indiana which list faculty available for sabbaticals etc. NSF applicants.

You might contact Dr. Pat Curlin, Public Sector Programs, AAAS, Washington D.C. They run several fellowship programs.

University and colleges, Junior Colleges.

Tell people about short term housing such as Warren House - Bank SASA.

Send advertising directly to the dean of college of Engr. or individual department chairman to avoid the lengthy routing.

ROTC University Constituents, previous participants from select schools, and faculty Senate Presidents or Graduate School Deans/Research Office.

American Physical Society - IEEE.

Ads in Science reach most scientists.

American College of Sports Medicine (published a journal and newsletter). International Society of Biomechanics (Newsletter), International Society of Biomechanics in Sports (Newsletter).

The American Chemical Society publishes a book entitled "College Chemistry Faculties" which lists all 2 and 4 year college faculty of chemistry and chemical engineering in the US and Canada.

Association of American Geographers and American Society of Photogrammetry.

Send to dept. of Atmosphoric Science, Colorado State University Ft. Collins, CO 8521. About 20 faculty and 75 graduate students.

Dr. Leslie McLemore, Dean of the Graduate School, Jackson State University. Dr. Frank Hale, Graduate School, The Ohio State University.

Send brochures and application forms to each participant in the 1985 summer program for transmittal to friends and others who may be interested in the program.

Colleges and universities in general.

Office of Research Administration. North Carolina A&T State University.

I would suggest that you consider going direct to the appropriate department chairs. They are most apt to see that the information gets to the interested faculty.

Mail to research directors at Universities. Run an ad in magazines like Physics Today.

(JOE) Joe Openings for Economists, and Chronicle of Higher Education.

Computer World.

Texas A&M.

Perhaps a notice in Communications of the ACM.

Last years participants for word of mouth.

Send to School of Engineering deans and Electrical Computer Engineering department heads.

ME (ASME magazine) and Aerospace America (AIAA magazine).

Dr. Darwin Johnson, Rehabilitation Counseling, Jackson State University, Jackson, MS 39217.

Mail directly to appropriate Academic Department's at University as well as graduate school and Research Services offices.

AAAI magazine.

Linguistics Society of America.

All Historically Black Colleges and Universities (HBCU). There are national conferences that occur annually, all presidents or their representatives attend. Get information from federal government.

AFROTC on each campus.

Advertise in Chemical and Engineering News.

Journals.

Dept. of Chemistry, Southern University, Baton Rouge, LA 70813.

I believe that Dept. heads should be on the list as well as trade journals.

ASEE, ASME Magazine.

Human Factors Society.

I believe that the publicity given by past participants is the most valuable advertising.

Aerospace America - AIAA Publication.

Dean of the university.

All Departments of Electrical Engineering, Deans, etc.

Send your list of available housing early to summer fellow.

ASEE magazine and ASEE Newsletter, CPIA/JANNAF Bulletin.

Dr. T. J. Bhattacharya, Land College, Jackson, Tenn., University of Kentucky, College of Pharmacy, Lexington, KY 40506.

Southern University, Dept. of Chemistry, Baton Rouge, LA 70813.

Chemical and Engineering News (magazine) American Chemical Society (Washington, D.C.), flyers to universities.

All colleges and universities.

ASEE, AIAA, SEM ASME.

Professional journals such as 'Civil Engineering'.

ASEE News.

Place ad in Chemical & Engineering News and Physics Today.

Institute of Electrical and Electronics Engineers (IEEE) Spectrum.

Division of offices of professional (societies, such as APS Fluid Dynamics Division and ASME Heat Transfer Division).

For families, any housing at "reasonable" rates.

American Association of Physics Teachers. Various Engineering Societies.

MARC and MBRS Programs of the National Institutes of Health.

All the engineering and science professional organizations and all universities.

Prof. Hassan Nagib, Mechanical Engineering, Clarence IIT, Chicago, IL.

Universities listed in the directory of the Human Factors Society, colleges of Engineering listed in the Annual Research Guide of the American Society for Engineering Education.

Dean of the Graduate School, Brown University, Providence, RI 02912.

Science, Graduate School Deans.

Could send brochures to all members of the Human Factors Society, if you don't already do so.

Dr. Linda Washington Carver, Research Laboratory, Tuskagee University, Tuskagee, AL; Dr. Kujore, Department of Chemistry, Morehouse College; Dr. Bender, Department of Biology, Morehouse College, Veterinary School of Medicine, Tuskegee, AL. (Attn: Chairman).

10. Addition of Graduate Student Program increased effectiveness of Program? NOTE NOT EVERY FACULTY MEMBER HAD A GRADUATE STUDENT WORK WITH THEM, THEREFORE THEY DID NOT ANSWER THIS QUESTION.

Yes - 95
No - 18

11. Did a student work with you? Yes - 46
No - 106

Comments:

Essential to completion of project.

Invaluable; he did the programming work that he could and freed me to do more planning.

Made the work go smoother, the time is so short that such a help goes a long way.

The graduate student raised some important questions, but she was not a major factor in the success or failure of my research initiatives. There is the possibility of continued work on my project by the graduate student, however.

The student was very helpful in Statistical Data Analysis and had a good experience working with applied problems.

The student did learn a lot from the summer research. However, the writing of brief reports and final reports seems to be away a lot of their learning time.

It was great experience for the student and was helpful to me because he did most of the computer work.

She was extremely helpful.

The student does not have to take the instructions from the Faculty Research Fellow with whom the student was nominated because the Faculty Research Fellow has not supervision power over the student.

Excellent worker; very helpful with many of the details and willing to take on limited autonomous tasks that greatly increased productivity.

Very helpful in both design and software development.

I could not have accomplished as much without one.

The graduate student was helpful in unanticipated ways: in addition to routine help, he was very creative, well informed and contributed substantially to the organization and direction of research.

Help provided by my graduate students was essential for conduct of laboratory work and data analysis.

More time on project.

Some help, some distraction.

Charles Wilton did most of the programming which made the analysis of the data possible.

It would have been better to select his problem closer to mine, however we chose a problem well suited to a thesis and solvable with the 10 weeks - this tends to limit the choice.

Great opportunity to work closely with student and give him training.

Students should have an already established.

This was the most satisfactory aspect of the program.

Difficult to use graduate student on a new research project which lasts only 10 weeks.

The presence of my graduate student enabled me to spend more time on theoretical approaches as opposed to computer programming.

Undergraduate student (senior) from Wright State (hired by AFWAL/POTC) helped me. He did an excellent job.

The work performed by the graduate student will be a part of their thesis research.

The good student handles all data management under my supervision and give me good time to consider the theoretical aspect of the research.

My summer research was greatly enhanced through the efforts expended by the student I was able to bring with me.

This greatly assisted my efforts, and was an excellent opportunity for the student.

Expand my involvement with the lab activities.

Essential aspect of my decision to participte.

Much less would have been accomplished, and grad. student would not have been able to come had support not been available.

The support was adequate.

The summer experience was more productive with the assistance of the graduate student than the previous summer without one.

The student who worked with me was from my home department. He was invaluable in preparing software and operating the minicomputer.

She played a very significant role during the summer and will continue to back at our home institution.

His strength in electronics by own abilities, resulted in much greater progress then I would have made otherwise.

Preliminary work was accomplished and routine investigations could be assigned. Suggest that graduate students be made more accountable to supervising faculty than base focal points.

Without the programming assistance of my graduate student, this research would not have been possible.

My graduate student played a vital role in the research. We were able to accumulate a large quantity of data. The field of Electron Microscopy is time consuming. We were able to divide up research duties. The final report reflects the amount of work implemented.

12. Program administration overall rating?

Excellent	- 81
Good	- 64
Fair	- 7
Poor	-

13a. Comments on the strong points of the program:

Excellent opportunity for USAF/university interaction on research of interest to both groups.

To have a mini grant to continue research. (One summer is short time to produce any effective result on a research project).

Close tie between Academic Institute and Research lab.

Excellent support by the Air Force.

Good match between USAF research interests and faculty's interests - the interaction was very beneficial.

Introduction to the USAF research interests.

Mixing of academics and defense personnel. Gives academics awareness of applications to defense.

Excellent opportunity to do research with some fine people and fine equipment.

Opportunities for a follow-up grant that allows more descretion on the part of the faculty researcher.

Professional development.

The opportunity to work with the government, the opportunity to work with individuals conducting research in related areas to the university setting.

Highly competent research colleagues; well-coordinated research project; excellent facilities; presummer visit (helps the participant in preparing for his role in the research several months before coming on board giving time for consultation of literature, thinking and planning etc.); per diem allowance; bi-weekly brief reports.

Excellent opportunity to be exposed to a different research environment with adequate support systems.

College professors can gain valuable research experience.

Opportunity to deal with research effort in on-going organization, availability of data and resource personnel to assist in research effort.

It provides an opportunity to do interesting research with other people and away from home university.

The freedom to explore the projects and problems of interest at my location, plus the complete cooperation of and warm acceptance by the personnel at my location (AFLC/XRS). A good research initiation into a relatively new topic area for me.

Provides faculty with summer research opportunities.

Lets university community know what problems are of interest to the Air Force and provides an opportunity to establish research funding through the laboratory.

The opportunity to do some research.

University faculty can make initial contact with the Air Force research organizations and hopely establish research tie and common effort.

Provides a background for faculty to build a research program with information on USAF funding sources.

Well-planned organized nature of selection assignment pay, report, completion aspects.

Carry over to mini grants etc., freedom to operate your own way.

Variety of research opportunities available.

The unique opportunity to explore what type of research activities Air Force is conducting or interested in and the possibility of long term association.

Pre-Summer Visit, RIP Grant Program, and the civilian exposure to the Air Force research tasks and interests.

A chance for use modern equipment - contacts for furture research at University.

Promotes interchange of ideas and enlarges the available expertise to deal with research problems of mutual interest. It enables professors to work full time on one research problem without other duties to distract them and to develop a funded research program.

Good collabration opportunity. Good funding possibility, enhance faculty and student research capability, etc.

It allows an academic person to increase contact outside his/her own local area and to better appreciate the advantages and disadvantages of other laboratory situations.

Excellent opportunity to exchange professional ideas and develop relationships between USAF and universities.

Follow on research opportunities and participation of graduate students.

Potential liasion between universities and the AF laboratories in the promotion of needed research; professional development.

The leadership provided by Mr. Neal Urquhart, the opportunity to interact with a very knowledgeable group of people in a new area, the equipment in the IPL is excellent.

The program provides a very valuable opportunity for the university faculty to get to know the USAF research program.

The opportunity to open new avenues of research, option to apply for a follow-on grant, opportunity to meet new colleagues, and opportunity to learn of additional AFOSR programs.

Non-personal basis of service. Strong technical library. Knowledgeable technical staff.

Unlimited exposure to interesting and creative research environment at WPAFB.

Flexible summer work schedule. The level of stipend and housing assistance (VOQ) from the base commander.

The quality of the HRL personnel. The resources and enthusiastic support available at the lab proved to make the difference between a just plan interesting project and a real intellectually challenging effort.

Provides the opportunity to do front line research. Provides access to eqiupment that is not available at most universities.

Written explanations of program; H. Powell.

Chance to meet people with similiar interests. Chance to make contacts within the governmental research community.

Wide variety of research interest, adequate funding, pre-summer visit, good management.

For me it was the opportunity to meet new people and do hands-on research in a new field unfettered by my usual problems.

Gain experience. Work in a production facility; view from inside. Make contacts with a completely different set of professionals.

Challenging practical technical problems. Excellent collaboration with colleagues at the laboratory; very friendly atmosphere.

Its wide range of research opportunities for newly Ph.D. graduates.

Support from all personnel at Brooks AFB, Library Faculty.

Well directed and organized research effort was the central strength of the program. Support was adequate and helped make the program a strong success.

Opportunity for educators to enhance their skills. Brings fresh approaches to USAF problems.

My effort focal point made the whole program rewarding. He allowed me a lot of freedom but redirected me when I went astray. I would hope he would continue as a Focal Point for other participants.

Opportunity for research, for communication with the Air Force, Mini-Grant program, generous stipend.

Strong support, good interaction with personnel of laboratory.

Opportunity to conduct research relevant to national defense programs and interests. Availability of sophisticated research equipment and computer facilities.

Opportunity to try something different and meet new people.

The program offers a good Channel of Communication between the academic world and the Air Force.

Interaction with AF people, real problems to work on.

Good lab facilities, flexibility.

The ability to do independent research on a topic of your own choosing with an expert in the area of research you pick.

Emphasis on research initiation, getting faculty away from the distractions at home institution, chance to work on problem relevent to "real world".

Close involvement in activities - learning the interest of the lab.

Connects professor's research interests with related Air Force programs.

The personnel at the research lab were excellent. Interaction with them provides excellent environment for research.

Allows small college professors to conduct research in the summer. AEDC is an excellent research facility. Excellent Scientists to work with. Research can be continued at one's home institution. Cooperation.

Excellent opportunity to meet and get to know people at lab to find out about their problems and the way they correctly handle them. Opportunity to exchange ideas.

Knowledge of on-going research and research interest in USAF, access to human and physical resources at the effort focal point, making joint efforts possible in the future.

The excellent administration allowed me and my student to concentrate on the technical and scientific aspects of the work.

University and Air Force contacts made. Opportunity to do research in an intensive environment.

Efficiency of management; research opportunities; business and academic contacts.

I like the opportunity to concentrate on research. There is also sufficient independence.

Dr. Agnes Bain was a very strong point. She served as an excellent moderator of disagreements between faculty and research USAF colleagues. Her role should be expanded and formulated to include the role of overseer of the relationship between colleagues and faculty.

Excellent research opportunities on current state-of-the-art problems.

Organization excellent: UES personnel responsive.

Practical experience in terms of discovering what subjects are of current interest to the working world and better knowledge of applications to be taught in courses for the future.

To build contacts with Air Force Research Lab. Opportunities for future research.

Opportunity to devote a dedicated block of time to research.

Faculty can choose research topics; not assigned. A continued relationship between lab and faculty can be maintained for years.

Pay rate, research locations, pay timetable.

Research program and funding information.

Excellent in bringing problems of current interest to the attention of young researchers. Very beneficial to those like me who have recently changed research fields. Follow-on research possibilities are good.

Identify the very important research projects for the future work, build the strong research relationship between Air Force Lab and the University, benefit to both the Air Force Lab and the University, good for the researchers who involved in the research projects.

The opportunity to do research and interact with cutting-edge investigators in the field.

Opportunity to participate in a concentrated research effort without a signficant amount of administration responsibilities.

The interest in the program and participants on the part of the Air Force personnel, and the resulting generosity with resources.

The ability to contribute to a research program in a meaningful way in a short period of time.

Opportunity to work with people interested in the same areas as yourself.

Possibility of mini-grant.

Helps to come in contact with good researchers in the area.

It enables a faculty to enter into new research areas.

UES data and brochures were well organized. Invoicing was straightforward and payment timely, very satisfied with administration.

Opportunity for the professor to get a research problem handed to him or her. The AF people seem happy to have the help. The facilities are good, the atmosphere conducive, and the AF personnel most helpful.

Opportunity to work on a truly applied research.

Very good for stimulating research of common interest.

Research opportunity, follow up potential.

Coordination of university research with that actually needed in the specific government agency. Also, colaboration and team work between faculty and the agency of government.

Association with government laboratories conducting research in my field of interest. Interaction with companies who have contracts with the government laboratories. Intellectual stimulation.

I believe that the program achieves its stated goals.

Opportunity to concentrate on a single prospect for 10 weeks. Opportunity for long-term research relations.

Future research opportunity.

The opportunity to interact with researchers at WPAFB and see their areas of interest.

Opportunity for faculty to interact with people dealing with practical development work. Gives ideas of what basic research still needs to be done.

Research opportunities, summer funding support, contacts made at the Air Force Base.

Very good opportunities for young or new researchers.

Availability of good equipment.

Gives a researcher who is early in career a chance to get going.

A research associate can concentrate the totality of 10 weeks with no interferences whatsoever to his/her research (For example no seminars, no presentations, no briefings from UES, etc.) The two buffets are about right for social activities.

I feel that the program is a worthwhile and educational one. It enhanced my knowledge of analytical chemistry.

Providing an opportunity for faculty members to participate in ongoing research programs of vital interest to the government.

Research environment facilities and a chance to work on a real world problem.

Chance to get into a laboratory.

Familiarize faculty with AF research interests - Interaction of academians and laboratory scientists - Exchange of scientific ideas - Availability of advanced, scientific equipment.

Research opportunity - new areas and techniques, new instruments and colleagues, grant opportunity.

Professional growth opportunity, mini-grant program, Wright-Patterson personnel, graduate student program.

(1) possibility of doing interesting research, (2) making good contacts and professional associations.

Opportunity to develop new research areas; Mini-Grant; new professional associations.

Follow-on opportunities.

Opportunity to learn of Air Force research interests and expand research contacts.

Adequate support and excellent facilities available.

The program is an excellent opportunity for faculty from small institutions to get research exposure and convey the state of art to students in the form of research and teaching.

Exposure to research center.

Opportunity to develop professional contacts and establish a continued relationship.

Excellent program.

Expose participant to research of current interest. Possibility of grant initiation. Get acquainted with people with related background. Tell students about serving the Air Force as a career through personal experience.

Informative announcement package, clear communication of the participant's responsibilities, efficient handling of biweekly invoices and reports, provision for a liaison person about 2 months before the summer.

Get new avenues of research possibilities opened.

Lab personnel, research area.

Well organized, reasonably well funded.

The faculty member is essentially his own supervisor during the assignment and is free to pursue his work as he sees the need.

One of the strongest points of the program is the professional affiliations which one develops. The acquaintances made last summer have proven to be lasting and professionally meaningful.

Good academic value, interesting activity, excellent, administration.

Opportunity to work with no other responsibilities.

Good contact with professionals at AMRL, good exposure to the needs of the Air Force and research opportunities available.

The opportunity to work with colleagues in well equipped laboratories and with adequate technical support. The insights which I gained about research activity supported by AFOSR.

Opportunity for establishing contacts and exchanging ideas between academic and Air Force laboratory researchers; opportunity for continuing research; increased expertise of SFRP participant, resulting in improved teaching at the home institution and awarenss of Air Force opportunities by students.

Good opportunity to understand WAF procedures and issues that concern them.

Working on a data base with large sample size.

People to work with, equipment, an important project, exposure to AFWL environment.

1) Opportunity to interact, with experienced, and highly qualified personnel, 2) Provides access to laboratory facilities unavailable at a university (simulators).

Gaining access to intriquing biomedical problems, using up to date equipment.

Opportunity for Mini Grants, and pre summer visit.

It was both interesting and challenging to work with well qualified members of the AFLMC. I want to do so again.

It's the best opportunity and impetus that I know of to get entreucked academicians commited to something new and exciting, and get some work published that benefits both the university, the Air Force, and students.

A chance to interact with new colleagues and broaden one's own research.

Allows faculty members to make a research association with the Air Force. Permits an opportunity for continuation of the research through mini-grant program, gives graduate students a chance to work in a different research environment.

The faculty member is essentially his own supervisor during the assignment and is free to pursue his work as he sees the need.

13b. Comments on the weak points of the program:

Stipend, library inadequate, contrained format of reports.

Information on housing needs to be supplied before the beginning of the 10-week period.

Need to emphasize the value of planning the research effort before the start of the 10 week period, if possible.

Housing arrangements.

Research is somewhat restricted by the priorities of the laboratory.

The typing of the reports was entirely consistant as each individual typed his report on his own machine.

Short research period.

Lack of specific information concerning the projects and problems of interest before applying, since the application contains my statement of preferences, and the success of the program may hinge on this information.

Takes one away from one's lab at a time when growth could be accelerated; on the other hand new projects, contacts and things like mini-grants more than off set this.

Timeframe may be too short - hard to develop project, do work, write meaningful final report in timeframe allocated. Stipend could also be increased.

The stipend is a little low for professors in senior positions.

Time is very short extensive preparation is necessary.

In my particular situation, I worked independently. I think this was due to changes occurring in the branch, along with the schedule constraints of branch personnel. It would have been useful to work closely with an individual, and learn more directly about the Air Force, its programs, goals, etc.

Directly oriented to a particular laboratories project and philosophies.

Lack of interaction among other labs on the base and other fellows.

Always some confusion - I don't know what to suggest - people just have to communicate.

Threat of withholding payment for last two weeks work.

To be away from home for an extensive period.

Not executing SECRET clearance for particular persons to work with classified material before the 10-week period ended.

Too short for an extensive project.

Little communication between UES and the fellows, poor billing system, poor reporting system. Very little follow up afterwards expect the mini grant.

It was a little slow getting started but made up for it later.

It would have been of interest to meet with other members of this program at the same base and to have more of a briefing on activities on base.

Poor association with other faculty appointees.

Difficulty in securing Security Clearances prior to the end of the research appointment.

UES did a very sloppy job in administering the program. They sent my final report information to the wrong address. They were very slow in dispensing pay checks. They sent paychecks to the wrong address.

Page limit on final report - my research was much too comprehensive to try to report on it within the 20-page limit.

Noisy and crowded offices.

The relationship between the summer research fellow and the graduate student in area of supervision.

As indicated earlier I felt the "extra" activities were a very valuable part of the program. I would recommend an effort to formalize the activity . A schedule of events and a list of people involved.

It would be nice if the research time could be longer than ten weeks.

Need an earlier orientation to base; maybe a brown bag lunch approach so other faculty can meet other faculty.

Some communication problems. Too much paper work.

Mini-Grant funds are too small.

No flexibility in supply system; if its not there when you arrive, you won't have it to work with. Because of the short planning period, the specifics of problems can not be addressed until the 10-week period. Effective research requires a supply mechanism that can respond in a short time period.

No serious faults. I have one suggestion. It may be very helpful to some participants if the first check (maybe 25% of the stipend) would be paid during the first week.

Lack of team work, at least in my case.

I thought perhaps the other participants should have met once a week. I believe the library at the lab should have been better stocked and am suggesting a few books to my effort focal point.

The slowness or impossibility of ordering materials which might be needed for research.

Too much petty administration, not enough important administration. There were too many unnecessary administrative details. Specifically, there were too many pay periods and progress reports. Only one progress report should be required. The NASA Summer Program has a more reasonable schedule:

1) Half of the stipend is paid at the beginning of the program.
2) One-fourth of the stipend is paid after five weeks upon receipt of a progress report.
3) The remaining one-fourth of the stipend is paid at the end of the program, upon completion of the final report.

Also, more emphasis should have been placed on getting the summer faculty at each research location together for an exchange of ideas, tours, seminars, etc. I would have liked very much to know who the other summer faculty were, what they were working on, etc. Also, I would have liked to have had a tour of the Center and a description of its mission. Actually, I was able to accomplish these things on my own initiative, but help from the program administrators would have been appreciated. Communication between universities and the Air Force is one of the goals of the program.

Failure to inform graduate students that cash advances can be obtained for front-end living expenses (apartment deposit, rent, etc.).

No provision for honoring publication charges. This is very bad.

The stipend level is in my opinion meager and needs to be increased.

10 weeks may be too short, pay maybe too low.

10 weeks is a short time to get any definite results. Also I would like to see some compensation for expenses occurred even for fellows living at their current domicide.

Very little specific information provided about A.F. labs in brochure initially received from U.E.S.

Often poor preparation by the laboratories. I would in many cases in which faculty fellows talents were poorly utilized.

Could improve on open forums and in-house conferences to provide professor's with a letter understanding of future trends within the Air Force.

Poorly equipped laboratory and totally absurd procurement system.

Convince VOQ to treat visiting professors as guests of the Air Force. It would really help matters if you could check in VOQ and know you would be there for the 10 weeks without "bumping". The VOQ is nice and I had rather stay there part time (being bumped at any time) then having to drive into Tullahome or Manchester and stay in a motel all the time.

Lack of access to main computer for 7 of 10 weeks. Very poor phone system. Have never seen more bureaucracy and most of itself destructive.

Lack of communication among groups of researchers working on similar areas.

Initial confusion over the "per-diem" issue.

Not possible to do research at home site.
I have no major criticisms, however, I would like to bring selected junior and senior students. I would like an opportunity for continuous association with my research colleague association with my research colleague over the year. Our problems has strong possibilities for a solution.

Inadeqaute ways to clarify objectives to research colleagues. The research colleagues must be better monitored to ensure against the misdirection of program goals. UES must take this problem seriously and design methods to ensure that these problems do not occur.

Confusion concerning 4th of July - needs clarification. Compensation to graduate students not incldued in Information Brochure.

On-going obligations and heavy workload of both research colleague and secretarial support which limit severely their time for communicating and/or cooperative venture.

At Sieler, little opportunity to discuss my project. No seminars or meetings with the whole group.

10 weeks can be too short for detailed work.

Short research period.

Stipend level could be increased to make it competitive with teaching summer rate. Mini-grant limit should be increased by about $10,000 without decreasing the number of these grants.

10 weeks is a little bit short for doing a good research, but this is limited by the summer schedule. This 10 week is good to start a project and let the project carry over after the summer.

Domestic life would have been facilitated if VOQ arrangements could have been made, rather than encountering the difficulties associated with apartment rental, etc.

Air Force procurement procedures are very slow - difficult to obtain any research supplies during the 10 week program.

The necessity for domestic interruptions caused by the 10 week residency.

Our lab was under construction and work space was not always available; also many colleagues and co-workers go on vacation.

There should be a larger gap between the filing of an invoice and the date it is required to be at UES.

Short tenure. Miss the family very much.

The level of compensation is designed for junior faculties. Perhaps it could be broadened to enable senior faculties with similar opportunities. Stipend too low to be attractive to the more senior researcher.

The program is run well. I am unable to suggest anything that needs improvement. My experience has been a good one.

Need very focused program considering time available.

Time is almost too brief to get project to conclusion.

Short available time.

Too short of time to be totally effective unless proposed project is well laid out in advance.

Delays in obtaining security clearances for people needing access to computers or reports containing classified information. Possible solution; make sure any late offered appointments won't require access to equipment or information, send security clearance forms as soon as possible.

Level of stipend.

Low pay.

Could use some flexibility; for example one could work at the home institution and spend time at the base when necessary rather than put in 8 hours a day 5 days a week. This would have been more beneficial in my case. Money for travel if it becomes necessary in connection with the project.

I was off by myself away from other participants - result of my physical location. It would have been interesting to compare notes.

Experimental projects need priority to get started.

10 week research period is very limiting to complete an in depth study, particularly when involving experimental research.

(1) time too short (12 weeks or variable) (2) working hours (lab) restrictrions (3) no time for final report preparation - should allow 1 week and typing support (4) grant selection procedures - should not reward early proposal recipients - not fair; all should be received and reviewed in competition based on merit with no early receipt benefit. Support, even if reduced, should be given to all worth applicants with projects of interest to the labs/AFOSR (5) secretarial support - non-existant.

I would have enjoyed more exposure to other Air Force research programs at WPAFB; housing information could be better.

Air Force supply system not compatible with a ten-week program unless research project is an on-going effort prior to summer and nothing unforeseen develops.

Better descriptions of research areas and projects needed to better tailor Fellows to labs.

10 consecutive weeks somewhat difficult to manage with academic schedule and relocation.

The stipend is not adequate.

Length.

Small stipend.

Not being able to get access to facilities and services requiring security clearance.

(Perhaps specific to my case) limited availability of staff time to interact technically with the participant.

There should be the option to inferface with an ongoing research effort. It is very difficult to begin a research effort if none of your colleagues is doing research.

Stipend level, limited ten week window.

Because research is an unpredictable endeavor, rapid response to channeling conditions is necessary at the Air Force installation. This is difficult given government purchase policies. I would suggest that given the short (10 week) period available for work that there should be a fund of "petty cash" set aside at the Air Force installation in connection with each UES grant. This and insistence on the pre-program visit should help overcome the problem.

It is a very difficult task to write up the final report during the 10-week period in the approved format. It takes more than a week to make certain that these guidelines are followed. It actually reduces the time involved with research activities.

One minor point to consider: the requirement that invoices be submitted on regular dates have caused some inconvenience when pay was delayed two weeks because of factors beyond the control of the participant. Schedules on a weekly basis would avoid these problems.

Somewhat isolated from colleagues.

The amount of testing required forced a very tight schedule, once the experiment was started, there was little or no time available to discuss theory, implications or future research on the topic.

Some problems with housing and with the level of secretarial assistance. Perhaps there can be some follow-up cooperative work outside of the Mini-Grant program.

Meager stipend requires a financial sacrifice by the participant and his/her family as well as the summer separation. No per diem for travel to and from the research lab site penalizes participants from distant home institutions.

Pay should be graded according to academic rank. Frankly, I found the pay to be poor in view of expenses such as house rental, car rental, and cost of having my home looked after in my absence.

Program continuity.

Shortness of the program, inconsistency of research interests (what is this year's AF bandwagon), inability to stay at one focal point more than two years (especially a problem when major equipment is involved requiring research at only that location), long lead time in ordering (more effort is needed to order a ten dollar item than a million dollar item).

More opportunities to meet with others in the program.

If the research is truely in a "new" area, 10 weeks is too short.

1) Extend time for final reporting if project becomes ambitious; i.e., either allow a very short Final Progress Report, with a 3-month deadline for a publication, or build in some flexibility (some fellows began writing their "final" report while the 10-week program was in progress; others, like myself, needed at least 10 weeks to finish the research before writing could begin, at which time they were also full time again with teaching loads; 2) offer to pay a fellow either $110/day or 2/3 of their academic salary, whichever is higher.

More attention could be given to providing follow-up help.

At this point I can find no weak points in this program. There are many strong points.

It is a very difficult task to write up the final report during the 10-week period in the appropriate format. It takes more than a week to make certain that these guidelines are followed. It actually reduces the time involved with research activities.

14. Has this been a fruitful, worthwhile, constructive experience?

Yes - 151
No - 1

APPENDIX 1.C

LABORATORY REPRESENTATIVE'S QUESTIONNAIRE & REPLY SUMMARY

1985 USAF/UES SUMMER FACULTY RESEARCH PROGRAM

EVALUATION QUESTIONNAIRE

(TO BE COMPLETED BY LABORATORY REPRESENTATIVE)

Laboratory/Center _____

Name _____

1. How do you rate the correspondence, verbal and telephone communication, and other aspects concerning program administration?

Excellent____ Good____ Average____ Poor____ How could it be improved?

_____

_____

2. The participant selection process is two-fold: academic and technical. Did you have sufficient time to conduct an evaluation of applications?

YES____ NO____

Comments:_____

_____

_____

3. Was the number of faculty researchers assigned to your organization satisfactory?

YES____NO____. If not, how many would be desired?_____ How do you determine this number?

_____

_____

LABORATORY REPRESENTATIVE QUESTIONNAIRE (Page 2 of 5)

4. Please rate the expense-paid pre-program visit:

Essential____ Convenient____ Not worth the expense____

5. In your opinion is the ten-week time period an optimum length of time to develop a viable working relationship among the faculty researchers, students, laboratory/center personnel and programs? YES____ NO____. If no, what length would it be.

_____

_____

Other comments:

_____

_____

_____

_____

6. Did your laboratory/center establish a seminar program, or other means, to "tap" the faculty associate's academic knowledge other than his research assignment? YES____NO____.

If yes, give description and evaluation.

_____

_____

_____

7. Did the laboratory/center conduct a general briefing, tour, and/or other formal means of welcome and introduction for the associate assigned to your organization?

YES____ NO____.

8. Did you have a formal exit exercise for each associate such as a final technical briefing presented to the organization management, a private interview, or other?

YES____ NO____.

9. In your opinion, what was the overall quality of this year's participants as measured by attitude, technical competence, work habits, production and meaningful research accomplishment?

(Note: These answers will be held confidential.)

List Names	Superior	Excellent	Average	Poor

10. Do you believe the Graduate Student Program enhances the Summer Research Program?

YES____ NO____

LABORATORY REPRESENTATIVE QUESTIONNAIRE (Page 4 of 5)

11. Was a student assigned under the Graduate Student Summer Support Program to your laboratory this summer? YES____ NO____. If so, was their participation productive? YES____ NO____.

12. Please furnish any recommendations you may have on improving the Graduate Student segment of the program.

_____

_____

_____

_____

_____

13. Site visits were made by Program Director and/or Administrator and the AFOSR representative. Do you feel these visits are beneficial to the program participants and Laboratory in understanding the management of the program? YES____ NO____. Do you feel these visits should be done again next year. YES____ NO____.

14. UES has a coordinator assigned at your base to assist the Summer Faculty participants in the administration of the program. Did you find this beneficial to the program. YES____ NO____. Are there any problem areas coordinators should administrator in future years?

_____

_____

_____

LABORATORY REPRESENTATIVE QUESTIONNAIRE (Page 5 of 5)

15. Please furnish any other comments or suggestion to improve the program in future years.

_____

_____

_____

_____

THANK YOU

1985 USAF/UES SUMMER FACULTY RESEARCH PROGRAM
EVALUATION QUESTIONNAIRE
LABORATORY REPRESENTATIVE

1. How do you rate the correspondence, verbal and telephone communication, and other aspects concerning program administration?

Excellent	6
Good	15
Average	6
Poor	
No Response	1

How could it be improved?

Send copies of all letters sent to summer faculty, etc., to the lab as well. Send letters of selection and policy letters to the lab first (before researchers).

Send all applications to one source (RADC/XP) for distribution, to eliminate confusion. Discuss final selections with division chiefs before firming up.

Information exchange during "appointment announcements, faculty acceptance or rejection, arrival at laboratory" period could be improved. We lost one appointee (we had only 11 instead of the 12 allocated) because we learned too late an appointee had turned down an offer while we had at least two other good applicants waiting for an offer.

Graduate students have more questions, need more help from UES; sometimes cannot use an official phone. Consider authorizing collect calls.

Security clearance slow. Had one instance of a graduate student's acceptance/subsequent rejection getting confused.

Correspondence was timely; communications friendly.

UES should make effort to simplify the written instructions for the program.

It was difficult to reach anyone at UES to answer questions. Need knowledgeable person at office at all times.

UES contact with the Laboratory officer most responsible for overseeing the faculty research was minimal. Most of the contact appeared to occur between UES and USAF OEHL/CV. Recommend that all sponsoring officers (Branch Chief or Project Officer) be assembled for an orientation meeting concerning the USAF/UES program.

The only experience we have indicates appropriate opportunity to evaluate proposals for summer Faculty Researchers but not gratuate studies. Our notification of Mr. Scott Koehnk, the graduate student working in Industrial Hygiene, was my name and arrival date no prior notice or contact.

A little better description of how the faculty researcher fits into the SFRP needs to be done. A lot of our faculty didn't know what they could or could not put on their travel voucher for the pre-summer visit or if they were allowed a rental car. Basically, a communication problem. Not sure what the faculty researcher received in the way of a pre-visit pckage but maybe you could send the information sheet (If there is one) to the labs and get comments on additions or clarifications.

Sufficient and timely information was provided by the UES to prepare for the summer research efforts.

The major problem was obtaining an interim security clearance so that the candidate could work on a classified project, The Strategic Defense Initiative.

Copies of the applicant's packages were late arriving in the Laboratory. Suggest, for the 1986 Program that packages be delivered to the Laboratory Representative sooner, so that more time can be given to the evaluation/selection process by the Laboratory.

2. Did you have sufficient time to conduct an evaluation of applications?

Yes - 23
No - 5

Comments:

Selection could be done entirely by mail. There is no need to have a selection meeting. All issues that come up could be resolved by mail or phone.

Although some of the applications came in late, we were aple to select good candidates.

Its always too short. Candidates "dribbled in," and hard to establish a ranking.

We would like to personal interview to narrow down final selections.

Yes, but we had to hurry; time for evaluation was too short in some cases.

It can be tough integrating late applications into the larger packets.

Could be several weeks longer.

Some evaluators were not available during the short evaluation period. An additional two weeks of evaluation time should be provided.

It would be helpful to receive all applications at the same time.

Additional time would be appreciated since applications received near the deadline don't always get fully evaluated when appropriate S&Es are on TDY or leave.

For the most part, our selection was based on the expressed interests of the faculty member and whether or not these interests could "dovetail" with Laboratory interests or projects. Academic and technical abilities were looked at but, were not the most important aspects for selection.

The applications were well done and presented all the facts needed to determine if individual could fit into our current efforts.

Yes for Faculty Researcher. No for graduate student (nor would we have had refusal rights, as I understand).

The evaluation process was too short. Our lab needs at least 2 weeks to be able to disseminate applications to our directorates and get responses. Each directorate must make their priority list and then the Chief Scientist selects from these to make his selection list. That's hard to do when we don't receive all the applications at once. Not sure there's an easy answer if you receive applications shortly before the labs need to make selections, anyway, this was a problem at our lab.

Sufficient opportunity existed for our organization to interview both the principal researcher and research assistants prior to formalizing the arrangements.

Folders were provided in sufficient time for a thorough review. We screened the applicants carefully and were pleased with our selection.

Once the applications were received the RPL turnaround to UES too short to allow Lab wide selection from the applications. An extra week would be helpful. By cutting corners we still made selections.

Could have used more time for the later applicants.

In most cases. We received applications over a period of time. The last ones received were after we had already formalized our selections and therefore could not be considered.

3. Was the number of faculty researchers assigned to your organization satisfactory?

Yes - 20
No - 8

If no, how many would be desired?

In RADC/ES, one for each branch. We have the bulk of the AFOSR R&D funds in the center. Four would be desired.

By noting requests for such researchers from our scientific staff.

12.

5.

How do you determine this number?

We really had more researchers than we could adequately handle, due to our organizational phase-down. With four faculty and 5 graduate students we were loaded.

For several years, we have had the opportunity of having three faculty assigned which has been good. We were able to use a total of four giving one to each of our R&D branches this year and it worked out well.

Based on the number of SFRP researchers requested by the Laboratory divisions.

AFWL has five technology offices which can utilize SFRP faculty researchers. We would like to place 2 SFRP participants in each of these offices.

Physical space limitations (desk space, etc.) restrict us to maximum of 5. This year we had projects for 6 based on expressed requirements of functional directorates.

5-7. OK this year. Much interest shown at Lab. We couldn't accept some good people. Next year and in future two more positions are requested.

Based on number of acceptable applications received, number of research topics available. We were allotted six slots this year and finally received eight. We could have used up to eleven.

4. Please rate the expense-paid pre-program visit:

Essential	-	19
Convenient	-	7
Not worth the expense	-	2

5. Is ten-week time period an optimum length of time to develop a viable working relationship among the faculty researchers, students, laboratory/center personnel and programs?

Yes - 20
No - 8

Other comments:

While I would not say that 10 weeks was optimal, any shorter time period would be unacceptable.

This is long enough if you "front load" your work with the researcher and get them started on the right foot.

Less than 10 weeks makes it difficult to complete an effort; more cuts into the academic schedule; however, a few professors can (and have) finished in as little as 5 weeks, so applications for shortened tours should be considered as valid.

10 weeks is about right. It might be that a flexible length of appointment varying between 8 and 12 weeks (to be determined by a faculty member and laboratory) would work out better in some cases. An option to consider.

A few extra weeks of work after the faculty researcher has been oriented into the program could provide substantial benefits to the laboratory.

At least 8 weeks seems to be necessary to fully digest the complex processes and procedures used by AFLC. Allowing 10 weeks gives time enough for some preliminary trials and discussions with AFLC personnel.

A variable length of time would be valuable. In some cases the personnel may have been available for another week or two and would have been very productive during that time. However, 10 weeks is generally the amount of time faculty have in the summer.

Because of delays in the Air Force supply system, needed equipment and materials are sometimes not received in time for use during the ten (10) weeks. A more positive method of continuing the work when the researcher returns to the school would help with this problem.

Very few projects can be completed within the 10 week timeframe. Four to six months would be more appropriate, if possible.

For the summer, three months June, July, August be better, 12 weeks. This could start around the end of May until the end of August.

I'm not sure an optimum length of time can be measured for this program. Ten weeks is perhaps out of convenience because of the time constraints of the faculty member, rather than to develop working relationships with the laboratory staff. One of the more serious drawbacks of the short time period is that any supplies or equipment to be ordered in support of the research must be done so at least 3-6 months ahead of the project start date. This is to compensate for the long delays encountered in the supply/procurement process.

This fact coupled with the number of people they interfaced with who were also frequently on travel or leave further justifies the desire to extend the research period.

For a new research candidate, part of the 10 weeks is spent adjusting to the Air Force methods and procedures for doing business so some time is lost from the actual research project.

This period is minimum, and difficult to extend due to time available. Must make every effort to have visitors ready to go upon arrival.

To develop relationship, time should be longer. Some Prof's don't have extra time in their school schedules. A variable time should be possible, up to twelve weeks. One prof sought less time than 10 weeks. An extra 2 weeks beyond 10 would help most projects. Most Prof's said they needed more time to wrap up their projects.

It is a trade off between academic schedules and useful project participation at the laboratory. Ten weeks is a very good choice. Shorter periods would diminish the work performance and longer periods would increase/scheduling restraints.

Depends on the nature of the research. Some laboratory engineers felt they should have a minimum of 15 weeks and up to a year. Other programs such as the mini-grant program and the University Resident Research Program fulfill longer term needs, and again, are often not taken advantage of.

12 weeks would be optimal for AAMRL.

6. Did your laboratory/center establish a seminar program, or other means, to "tap" the faculty associate's academic knowledge other than his research assignment?

Yes - 12
No - 106

If yes, give description and evaluation.

Meta Analysis techniques - Kraiger - very good presentation. Individual Differences in Automatic and Controlled Information Processing - Ackerman - very good technical presentation.

We had an end-of-tour report where the faculty associates gave a presentation, mostly on their work. It was very helpful.

This was accomplished on an individual basis.

Faculty members encouraged to provide seminars on subjects related to their research as well as provide end of tour research.

Because of the diverse fields involved, individual group discussions were used to tap the knowledge of the various associates.

Weekly meetings with staff allowing this input.

Not a seminar program per se, but our candidate Dr. Kolitz provided technical support in interaction with other Air Force and Federal Contractor Research Corporations such as ANSER. In addition, he attended a workshop at MIT which provided further insight in the research project he was assigned.

Informal within Division this summer. Next year a more formal program will be implemented. Informal worked but a longer-tenure (12 weeks) and more seminars would be good. Most Profs felt they had too much to do and too little time to do it.

Very informally, groups were assembled to provide an ad hoc forum in several cases.

Faculty members gave seminars to fellow workers in some cases.

Researchers usually gave at least a final briefing to the sponsoring group and sometimes several presentations were made.

7. Did the laboratory/center conduct a general briefing, tour, and/or other formal means of welcome and introduction for the associate assigned to your organization?

Yes - 25
No - 3

8. Did you have a formal exit exercise for each associate such as a final technical briefing presented to the organization management, a private interview, or other?

Yes - 19
No - 9

9. In your opinion, what was the overall quality of this year's participants as measured by attitude, technical competence, work habits, production and meaningful research accomplishment?

List Names	Superior	Excellent	Average	Poor
	70	62	9	

10. Do you believe the Graduate Student Program enhances the Summer Research Program?

Yes - 24
No - 1
No experience - 3

11. Was a student assigned under the Graduate Student Summer Support Program to your laboratory this summer?

Yes - 22
No - 5
No experience - 1

If so, was their participation productive?

Yes - 22
No -

12. Please furnish any recommendations you may have on improving the Graduate Student segment of the program.

If graduate students are to work with faculty associates, their tenures should coincide (in most cases). Graduate students require more supervision; therefore, the number of students in a lab should be fewer than the number of professors.

Since their selection occurs after the professors are selected, there is a very real timing problem for the laboratory. I do not know how to solve this without insisting that a graduate student come with his professor and that both applications are evaluated at the same time.

More time for evaluating applications - an increase in number of faculty allocated to the Lab.

We need to get the program information out earlier to increase participation - graduate students are a tremendous asset.

Encourage Summary Faculty applicants to make the program better known to their students.

It would be desirable for some means to be established to enable graduate students to be paid earlier than in the current arrangement.

The graduate students need to have a more structured project than the faculty members do. Sometimes the faculty members lead them and other times the AFLC staff must. More thought needs to be given by both AFLC and the students toward the selection of taskings.

Do not require graduate student to be affiliated with faculty member entered into program as a prerequisite for selection.

Since some of the SFRP researchers came from schools which do not have graduate science/engineering programs, consideration should be given to permitting their advanced undergraduate students to participate in the GSSP.

Need earlier planning, starting with us, no later than February or March. In the past we have found graduate students very helpful.

Additional contact prior to assignment to ensure an appropriate project beneficial to both parties.

Better advertisement of the opportunity both to the faculty members and graduate students.

The graduate student segment significantly contributed to the success of this program and must be continued. The students, under the direct supervision of the principal researcher, execute a substantial amount of work consistent with the SOW requirements.

It seemed that only one graduate student applied with his professor originally. We had two schools represented with a Professor and a student. It seemed to work well, but we had no prior experience with which to compare. I've received no complaints from students about their status or workload.

The addition of Graduate Students is very beneficial to the productivity.

AEDC had both sponsored and independent students and we were well pleased with both categories.

Other than requiring more time to complete the applicant's evaluation process for selection, everyone was extremely pleased with the program.

13. Site visits were made by Program Director and/or Administrator and the AFOSR representative. Do you feel these visits are beneficial to the program participants and Laboratory in understanding the management of the program?

Yes - 21
No - 3
N/A - 4

Do you feel these visits should be done again next year?
Yes - 21
No - 5

14. UES has a coordinator assigned at your base to assist the Summer Faculty participants in the administration of the program. Did you find this beneficial to the program?
Yes - 16
No -
N/A - 3

Are there any problem areas coordinators should administrator in future years?

It would help if the base coordinator (WPAFB) would visit me, briefly at beginning of each new summer period for a get-reacquainted visit.

Coordinators need to learn by experience and need to document their experience and recommendations at the end of the summer. Coordinators need to be selected early and start work early (before they are actually on the payroll if that can be worked).

Dr. Bain, our Area Coordinator, worked out very well. She did a thorough job in all respects, was available when needed, and did not hesitate to become involved wherever she could help.

The coordinator's name and phone number should be provided to all of the participants in order that they can call him if there are any questions.

Housing accomodations at WPAFB Visiting Officer's Quarters or Wright State University would be highly desirable.

Additional assistance with housing would be helpful since the VOQ never seems to be available and finding a place to stay for 10 weeks at a reasonable cost is difficult for the faculty and especially the students.

The UES coordinator assigned to assist the Summer Faculty participants never contacted me so I'm unable to answer the question.

Col. Graham coordinated with him, I did not.

Scott Kohnk talked several times with the UES representative and was pleased with assistance received.

More definitive guidance is necessary regarding follow-on research efforts beyond the ten week summer period. This guidance should prescribe specific formats, level of endorsements, timing of application, duration of effort and cost.

Again we did not deal with the coordinator but the candidate's interactions were positive.

More emphasis should be put on finding living quarters for out-of-town Summer Faculty and Graduate Students. Too much of this responsibility fell on the Laboratory Representatives.

15. Please furnish any other comments or suggestion to improve the program in future years.

Some confusion always exists when non-federal individuals come to work for the Government. Being aware of some of the red tape associated with such an assignment ahead of time might be useful to the participants.

It would be beneficial to be able to interview the candidates before selection, both from our point of view and theirs.

Solicit list of potential applicants/universities from laboratory/center prior to mailing out applications to ensure appropriate universities are contacted. Applicants should indicate area of interest, not just resume qualfications.

More information about the program and it's working should be provided to the project officers. It appeared to me, after reading this questionnaire, that I was unaware of a great deal of background information about the USAF/UES Summer Faculty Research Program. Not enough information filtered down. This should be improved in future years.

Most of the work we do requires access to classified information so getting a clearance is essential. Also, if the candidate has any special areas he wishes to work he should express his desires in terms of a Statement of Work and/or Work Plan. This year we established the work structure and coordinated with the candidate.

Anything to allow the profs to get a quick start into their program is helpful. Experimentalists need specialty equipment or chemicals. Its too late to order them after they get to the Lab. A slightly longer tenure (11 or 12 weeks) would help. The pre visit worked well this year. We encourage it. The professors seemed to be time limited. We need to be able to provide administrative support such as typing. This year was a problem as I believe was the year before. UES has responded well to any request. Thank you very much.

We had trouble with security clearances. To the best of my knowledge, some clearances were never received, and when they were, the information was forwarded inproperly, or to the wrong office. Need better communication on roles of different people involved in the program,such as who has authority to approve vouchers, proposals, final reports, etc.

UES should attempt to make arrangements for suitable living quarters for out-of-town Summer Faculty and Graduate Students and stop relying upon the Visiting Officers Quarters on base. The VOQ refuses to physically support this program, even though those in charge assure you they will. When the individual arrives, his/her reservation many times is not available and the attitude of those working at the reservations desk is absolutely "unfriendly". Laboratory representatives have used all the influence with the Air Force they can muster, but to no avail. I feel this situation creates a very bad impression on both the U.S. Government as well as UES.

APPENDIX II

A. Program Statistics

B. List of 1984 Participants

C. Participant Laboratory Assignments

APPENDIX II A

Summer Faculty Research Program

Sponsored by
Air Force Office of Scientific Research

Conducted by
Universal Energy Systems, Inc.

Program Statistics

Program Statistics

1. Applications Received (by Laboratory)

Organization		Choice 1st	2nd	3rd	Total
APL	(WPAFB)	33	16	11	60
AMRL	(WPAFB)	51	27	38	116
AD	(Eglin)	19	17	18	54
AEDC	(Arnold)	9	8	7	24
AL	(WPAFB)	22	14	7	43
BRMC	(WPAFB)	2	1	1	4
ESMC	(Patrick)	5	7	8	9
ESD	(Hanscom)	12	4	9	25
ESC	(Tyndall)	19	18	22	59
FDL	(WPAFB)	36	16	7	59
FJSRL	(USAFA)	29	15	24	68
GL	(Hanscom)	25	9	8	42
HRL/LR	(WPAFB)	5	11	5	21
HRL/OT	(Williams)	9	9	9	27
HRL/MO	(Brooks)	24	17	14	55
HRL/ID	(Lowry)	15	14	11	40
LMDC	(Maxwell)	36	15	14	65
LC	(WPAFB)	3	11	9	23
LMC	(Gunter)	11	7	11	29
ML	(WPAFB)	24	22	16	62
OEHL	(Brooks)	17	7	12	36
RPL	(Edwards)	26	17	14	57
RADC	(Griffiss)	42	31	13	86
SAM	(Brooks)	47	28	9	84
WL	(Kirtland)	19	19	11	49
	Totals	540	360	308	

2. Number of Participants - 154

Number with Bachelors Degree	- 1
Number with Masters Degree	- 5
Number with Doctorate Degree	- 148

3. Academic Ranking

Assistant Professor	- 50
Associate Professor	- 48
Department Chairman	- 8
Instructor	- 5
Professor	- 42
Distinguished Professor	- 1

Program Statistics
Continued

4. Number of Participants at Each Laboratory

Organization

APL	(WPAFB)	- 9	HRL/LR	(WPAFB)	- 2
AMRL	(WPAFB)	- 9	HRL/OT	(Williams	- 3
AL	(Eglin)	- 9	HRL/MO	(Brooks)	- 4
AEDC	(Arnold)	- 6	HRL/ID	(Lowry)	- 2
AL	(WPAFB)	- 8	LMDC	(Maxwell)	- 4
BRMC	(WPAFB)	- 2	LMC	(Gunter)	- 3
LC	(WPAFB)	- 1	ML	(WPAFB)	- 12
ESMC	(Patrick)	- 0	OEHL	(Brooks)	- 3
ESD	(Hanscom	- 2	RPL	(Edwards	- 5
ESC	(Tyndall)	- 5	RADC	(Griffiss)	- 11
FDL	(WPAFB)	- 11	SAM	(Brooks)	- 16
FJSRL	(USAFA)	- 8	WL	(Kirtland)	- 8
GL	(Hanscom	- 11			
				Total	154

5. Discipline Represented - 43

Aero Engineering	- 3	Geophysics & Mechanics	- 1
Aerospace Engineering	- 2	Health Physics	- 1
Astrophysics	- 1	Industrial Engineering	- 2
Atmospheric Science	- 1	Law	- 1
Biochemical Genetics	- 1	Linguistics	- 3
Biology	- 3	Management	- 3
Biomechanics	- 1	Marketing & Statistics	- 1
Biophysics	- 3	Material Science	- 2
Chemical Physics	- 1	Mathematics	- 11
Chemistry	- 24	Mechanical Engineering	- 14
Civil Engineering	- 2	Mechanics	- 2
Clinical Psychology	- 1	Medical Microbiology	- 1
Computer Science	- 8	Metallurgy	- 1
Economics	- 2	Microbiology	- 2
Education	- 3	Nuclear Physics	- 1
Educational Psychology	- 2	Physics	- 15
Electrical Engineering	- 13	Physiology	- 2
Engineering	- 1	Psychology	- 6
Engineering Mechanics	- 4	Solid State Physics	- 4
Environmental Health	- 1	Statistics	- 2
Geography	- 1	Structural Engineering	- 1

Program Statistics
Continued

6. Colleges and Universities Represented - Total 99

Atlanta University	- 1	Syracuse University	- 1
Auburn University	- 3	Temple University	- 1
Ball State University	- 1	Tennessee Tech.	- 1
Belmont College	- 1	Texas A&M University	- 2
Brown University	- 1	Tougaloo College	- 1
California State Univ.	- 3	Trinity University	- 1
Cedarville College	- 2	Troy State University	- 1
Central State University	- 2	Tuskegee Institute	- 1
Cheyney State College	- 1	University of Alabama	- 3
Christian Heritage College	- 1	Univ. of Central Arkansas	- 1
Clark College	- 1	University of Cincinnati	- 2
Clemson University	- 1	University of Colorado	- 3
Coastal Carolina College	- 1	University of Dayton	- 4
Colorado School of Mines	- 1	University of Florida	- 4
Davis & Elkins College	- 1	University of Houston	- 1
Dillard University	- 1	University of Illinois	- 4
Gallaudet College	- 1	University of Iowa	- 1
Georgia Southern College	- 1	University of Kentucky	- 2
Grambling State University	- 1	University of Lowell	- 1
Holy Cross College	- 1	University of Maine	- 1
Howard University	- 2	University of Massachusetts	- 1
Iowa State University	- 3	University of Minnesota	- 1
Jackson State University	- 3	University of Mississippi	- 1
Kansas State University	- 3	University of Missouri	- 2
Lehigh University	- 1	University of Nevada	- 1
Louisiana State Univ.	- 1	Univ. of North Alabama	- 1
Louisiana Tech University	- 1	University of Oklahoma	- 1
Marshall University	- 1	University of Scranton	- 1
Meharry Medical College	- 3	Univ. of South Carolina	- 2
Miami University	- 1	Univ. of South Florida	- 1
Middle Tennessee State Univ.	- 1	Univ. of Southern Colorado	- 1
Mississippi State University	- 1	Univ. of Southern Maine	- 1
Morehouse College	- 1	University of Tennessee	- 1
North Carolina A&T State	- 2	University of Texas	- 3
Northeastern University	- 3	University of the Pacific	- 1
Oakland University	- 2	University of Toledo	- 1
Ohio State University	- 2	University of West Florida	- 3
Ohio University	- 2	Vasser College	- 1
Old Dominion University	- 1	Vernon Regional Jr. College	- 1
Riddle Aero. University	- 1	Virginia Poly. Inst. & State University	- 2
Sam Houston State University	- 1	Washington State University	- 1
Slippery Rock University	- 1	Wellesley College	- 1
South Carolina State College	- 1	West Georgia College	- 1
Southern Illinois University	- 1	West Virginia Inst. of Tech.	- 1
Southern University	- 3	Whittenburg University	- 2
Southern Utah State College	- 1	Wichita State University	- 2
Southwest Missouri State	- 1	Winston Salem State Univ.	- 1
St. Cloud State University	- 1	Wright State University	- 8
St. Mary's University	- 1	Xavier University	- 1
State Univ. College of NY	- 2		

Total 154

Program Statistics
Continued

7. States Represented - 33

Alabama	- 9
Arkansas	- 1
California	- 5
Colorado	- 5
District of Columbia	- 3
Florida	- 9
Georgia	- 5
Illinois	- 7
Indiana	- 1
Iowa	- 2
Kansas	- 5
Kentucky	- 2
Louisiana	- 8
Maine	- 2
Massachusetts	- 5
Michigan	- 2
Minnesota	- 2
Mississippi	- 6
Missouri	- 3
Nevada	- 1
New York	- 4
North Carolina	- 3
Ohio	- 26
Oklahoma	- 2
Pennsylvania	- 5
Rhode Island	- 1
South Carolina	- 5
Tennessee	- 7
Texas	- 10
Utah	- 1
Virginia	- 3
Washington	- 1
West Virginia	- 3

8. Age of Participants -

Average - 42.2

APPENDIX II B

LIST OF PARTICIPANTS

LIST OF PARTICIPANTS

NAME/ADDRESS	DEGREE, SPECIALTY, LABORATORY ASSIGNED
Dr. Phillip Ackerman Assistant Professor University of Minnesota Dept. of Psychology Elliott Hall 75 E. River Rd. Minneapolis, Minnesota 55455 (612) 376-3139	Degree: Ph.D., Philosophy in Psychology, 1984 Specialty: Human Abilities, Cognitive Processes, Research Methodology Assigned: HRL/MO
Dr. Samuel Adams Associate Professor Iowa State University Dept. of Industrial Engineering 212 Marston Hall Ames, Iowa 50011 (515) 294-5065	Degree: Ph.D., Industrial Engineering 1966 Specialty: Human Factors Engineering (Ergonomics), Biomechanics Assigned: AMRL
Dr. Vernon Allen Professor Tennessee Technological Univ. Dept. of Chemistry Box 5055 Cookeville, Tennessee 38505 (615) 528-3425	Degree: Ph.D., Polymer Science, 1960 Specialty: Polymer Structure - Property Relationship Assigned: AFWAL/ML
Dr. Jihad Alsadek Assistant Professor & Chairman Tougaloo College Department of Economics Tougaloo, Mississippi 39174 (601) 956-4941	Degree: Ph.D., Economics, 1983 Specialty: Economics Assigned: HRL/OT
Dr. Deborah Armstrong Assistant Professor University of Texas Division of Life Sciences San Antonio, Texas 78285 (512) 691-445[illegible]	Degree: Ph.D., Neuroscience, 1982 Specialty: Neurophysiology Assigned: SAM

Dr. Lucia Babcock
Assistant Professor
Louisiana State University
Department of Chemistry
Baton Rouge, Louisiana 70803
(504) 388-4694

Degree: Ph.D., Inorganic Chemistry, 1978
Specialty: Ion-Molecule Chemistry, Kinetics
Assigned: AFGL

Dr. Francesco Bacchialoni
Associate Professor
University of Lowell
Dept. of Electrical Engr.
1 University Avenue
Lowell, Massachusetts 01854
(617) 452-5000

Degree: Ph.D., Engineering, 1946
Specialty: Control Systems, Digital Signal Processing, Microprocessors
Assigned: AFGL

Dr. Mukul Banerjee
Professor
Meharry Medical College
Physiology Department
Nashville, Tennessee 37208
(615) 327-6288

Degree: Ph.D., Animal Physiology, 1964
Specialty: Respiratory Physiology, Environmental Physiology
Assigned: SAM

Dr. Rex Berney
Associate Professor
University of Dayton
Physics Department
300 College Park
Dayton, Ohio 45469
(513) 229-3012

Degree: Ph.D., Solid State Physics, 1978
Specialty: Digital Electronics, Photochromic Materials
Assigned: AFWAL/AL

Dr. Richard Bertrand
Professor of Chemistry
University of Colorado
Department of Chemistry
P. O. Box 7150
Colorado Springs, Colorado 80933-7150
(303) 593-3139

Degree: Ph.D., Chemistry, 1969
Specialty: NMR Spectroscopy, Atomic Spectroscopy
Assigned: FJSRL

Dr. Peter Binkert
Associate Professor
Oakland University
Linguistics and Classics
Department of Linguistics
Rochester, Michigan 48063
(313) 370-2175

Degree: Ph.D., Linguistics, 1970
Specialty: Linguistic Theory, Natural Language Understanding by Computers
Assigned: HRL/IO

Dr. Zinny Bond
Associate Professor
Ohio University
Linguistics Department
204C Gordy Hall
Athens, Ohio 45701
(614) 594-6539

Degree: Ph.D., Linguistics, 1971
Specialty: Speech Acoustics, Speech Perception
Assigned: AMRL

Dr. Kevin Bowyer
Assistant Professor
University of South Florida
Computer Science & Engr. Dept.
Tampa, Florida 33620
(813) 974-3032

Degree: Ph.D., Computer Science, 1980
Specialty: Software Engineering, Computer Architecture, Computer Networks
Assigned: AD

Dr. Eugene Brown
Associate Professor
Virginia Polytech Institute and State University
Blacksburg, Virginia 24060
(703) 961-7199

Degree: Ph.D., Mechanical Engineering, 1968
Specialty: Fluid Mechanics, Computational Fluid Dynamics
Assigned: WL

Dr. Linda Buehner
Assistant Professor
Wittenberg University
Education Department
P. O. Box 720
Springfield, Ohio 45501
(513) 327-6421

Degree: Ed. D., Curriculum and Instruction, 1983
Specialty: Learning and Developmental Handicaps, Reading
Assigned: HRL/LR

Dr. Connie Carrington
Assistant Professor
University of South Carolina
Mechanical Engineering Dept.
College of Engineering
Columbia, South Carolina 29208
(803) 777-7144

Degree: Ph.D., Engineering Mechanics, 1983
Specialty: Dynamics and Controls
Assigned: AFWAL/FDL

Dr. Robert Chamberlain
Assistant Professor
University of Alabama
Dept. of Aerospace Engr.
241 Hardaway Hall
University, Alabama 35486
(205) 348-7300

Degree: Ph.D., Aeronautical and Astronautical Engineering, 1984
Specialty: Computational Fluid Dynamics
Assigned: AFWAL/FDL

Dr. Jharna Chaudhuri
Assistant Professor
Wichita State University
Mechanical Engr. Department
Box 35
Wichita, Kansas 67208
(316) 689-3402

Degree: Ph.D., Materials Science, 1982
Specialty: Materials Science, Metallurgy, Thin Films, Electronic Materials
Assigned: AFWAL/AL

Dr. Lea Chen
Assistant Professor
The University of Iowa
Dept. Mechanical Engineering
2206 EB
Iowa City, Iowa 52242
(319) 353-5695

Degree: Ph.D., Mechanical Engineering, 1981
Specialty: Combustion
Assigned: AFWAL/APL

Dr. David Choate
Assistant Professor
Xavier University
Mathematics Department
New Orleans, Louisiana 70125
(504) 486-7411

Degree: Ph.D., Mathematics, 1982
Specialty: Algebra and Number Theory
Assigned: RADC

Dr. Karen Chou
Assistant Professor
Syracuse University
Dept. of Civil Engr.
Syracuse, New York 13210
(315) 423-3314

Degree: Ph.D., Philosophy, Structural Engineering, 1983
Specialty: Structural Engineering, Structural Reliability, Application of Probability and Statistics in Chemical Engineering
Assigned: ESC

Dr. Louis Chow
Assistant Professor
Washington State University
Mechanical Engineering Dept.
Pullman, Washington 99164-2920
(509) 335-1327

Degree: Ph.D., Mechanical Engineering, 1978
Specialty: Heat and Mass Transfer, Fluid Mechanics
Assigned: AFWAL/APL

Dr. Derald Chriss
Instructor
Southern University
Department of Chemistry
Baton Rouge, Louisiana 70813
(504) 771-3990

Degree: M.S., Chemistry, 1981
Specialty: NMR Spectroscopy, X-Ray Crystallography, Gas Chromatography, Magnetic Susceptibility Studies
Assigned: AFWAL/ML

Dr. David Chung
Professor
Howard University
Department of Physics
Washington, D.C. 20059
(202) 636-7903

Degree: Ph.D., Solid State Physics, 1966
Specialty: Fiber Optics Sensors, Ultrasound, Solid State Electronics
Assigned: RADC

Dr. Gale Clark
Associate Professor
Middle Tennessee State Univ.
Chemistry Department
P. O. Box 137
Murfreesboro, Tennessee 37132
(615) 898-2300

Degree: Ph.D., Analytical Chemistry, 1968
Specialty: HPLC using Electrochemical and Fluorescent Detection
Assigned: ESC

Dr. David Cochran
Assistant Professor
Clemson University
Electrical and Computer Engineering Department
Clemson, South Carolina 29631
(803) 656-3190

Degree: Ph.D., Electrical Engineering, 1981
Specialty: Solid State
Assigned: RADC

Dr. Alvin Compaan
Professor
Kansas State University
Department of Physics
Cardwell Hall
Manhattan, Kansas 66506
(913) 532-6786

Degree: Ph.D., Physics, 1971
Specialty: Laser Interaction with Semiconductors
Assigned: AFWAL/AL

Dr. Thomas Connolly
Professor
Embry-Riddle Aeronautical University
Aeronautical Science
Regional Airport
Daytona Beach, Florida 32014
(904) 252-5561

Degree: Ed.D., Technical Education, 1979
Specialty: Aviation Education, Instructional Technology
Assigned: HRL/OT

Dr. Hobert Corley
Instructor
Davis and Elkins College
Computer Science Dept.
Elkins, West Virginia 26241
(304) 636-1900

Degree: M.S. Computer Science, 1980
Specialty: Computer Science
Assigned: HRL/LR

Dr. Billy Covington
Assistant Professor
Sam Houston State University
Physics Department
Hunstville, Texas 77341
(409) 294-1606

Degree: Ph.D., Physics, 1978
Specialty: Solid State Physics
Assigned: AFWAL/ML

Dr. Dennis Cravens
Instructor
Vernon Regional Jr. College
Science and Math. Dept.
4400 College Drive
Vernon, Texas 76384
(817) 552-6291

Degree: Ph.D., Molecular Biophysics, 1977
Specialty: Mathematic Models, (numerical calculations)
Assigned: RPL

Dr. Parviz Dadras
Associate Professor
Wright State University
Mechanics Systems Engineering
Dayton, Ohio 45435
(513) 873-2944

Degree: Ph.D., Mechanical Engineering, 1972
Specialty: Mechanics, Deformation Processing, Material Properties
Assigned: AFWAL/ML

Dr. Charles Davis
Assistant Professor
University of Toledo
Department of Math.
Toledo, Ohio 43606
(419) 537-2297

Degree: Ph.D. Statistics, 1976
Specialty: Statistics
Assigned: AMRL

Dr. Vito DelVecchio
Professor of Biology
University of Scranton
Scranton, Pennsylvania 18510
(717) 961-6117

Degree: Ph.D., Biochemical Genetics, 1967
Specialty: Immunochemistry and Recombinant DNA Probes
Assigned: SAM

Dr. Hermann Donnert
Professor
Kansas State University
Department of Nuclear Engineering
Ward Hall
Manhattan, Kansas 66506-7039
(913) 532-5960

Degree: Ph.D., Mathematics and Physics, 1951
Specialty: Radiation Physics, Nuclear Weapon Effects, Plasma Physics
Assigned: FJSRL

Dr. Melvin Druelinger
Professor
University of Southern Colorado
Chemistry Department
2200 N. Bonforte Blvd.
Pueblo, Colorado 81001
(303) 549-2166

Degree: Ph.D. Chemistry, 1967
Specialty: Organic Chemistry (Mechanisms, Synthesis, Photochemistry, Energetic Materials Fluorinations)
Assigned: RPL

Dr. Charles Drummond, III
Associate Professor
The Ohio State University
Dept. of Ceramic Engineering
2041 College Road
Columbus, Ohio 43210
(614) 422-2960

Degree: Ph.D., Applied Physics, 1974
Specialty: Glass Structure and Properties and Composites
Assigned: AFWAL/ML

Dr. Leroy Eimers
Associate Professor
Cedarville College
Dept. of Science and Math
Cedarville, Ohio 45314
(513) 766-2211

Degree: Ph.D., Theoretical Physics, 1970
Specialty: Mathematics, Physics
Assigned: AFWAL/APL

Dr. Hudson Eldridge
University of Central Arkansas
Physics Department, LSC 149
Conway, Arkansas 72032
(501) 450-3146

Degree: Ph.D., Nuclear Physics, 1967
Specialty: Experimental Nuclear Physics, Computing, Digital Electronics
Assigned: WL

Dr. Harry Emrick
Associate Professor
Colorado School of Mines
Dept. of Engineering
Golden, Colorado 80401
(303) 273-3675

Degree: Ph.D., Geodetic/Computer Science, 1973
Specialty: Positional Geodesy - Computer Applications
Assigned: FJSRL

Dr. John Erdei
Assistant Professor
University of Dayton
Dept. of Physics
300 College Park
Dayton, Ohio 45469
(513) 229-2318

Degree: Ph.D., Condensed Matter Theory, 1983
Specialty: Critical Phenomena and Field Theory
Assigned: AFWAL/APL

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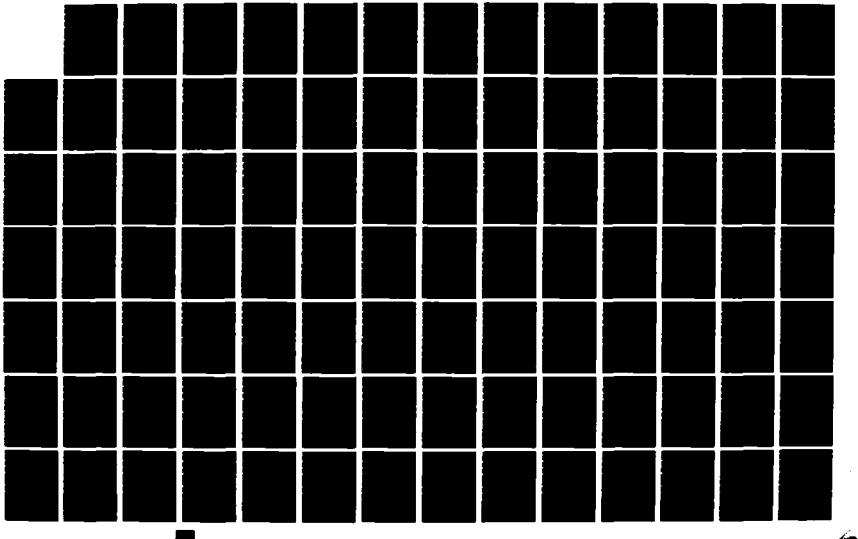

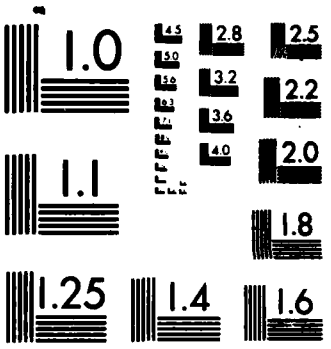

Dr. Dah-Nien Fan
Professor
Howard University
Dept. of Mechanical Engr.
Washington, D.C. 22059
(202) 636-6607

Degree: Ph.D., Aerospace Engineering, 1966
Specialty: Fluid Mechanics, Aerodynamics, Tensor Theory, Applied Mathematics
Assigned: AFWAL/FDL

Dr. Mack Felton
Chairman and Professor
Southern University at New Orleans
Biology Department
6400 Press Drive
New Orleans, Louisiana 70126
(504) 282-4401

Degree: Ph.D., Microbiology, 1973
Specialty: Virus Adsorption, Microbial Ecology, Physiology
Assigned: SAM

Dr. Edna Fiedler
St. Mary's University
Department Head - Psychology
One Camino Santa Maria
San Antonio, Texas 78284
(512) 436-3314

Degree: Ph.D., Psychology, 1972
Specialty: Social and Clinical Psychology
Assigned: HRL/MO

Dr. John Flach
Assistant Professor
University of Illinois at Urbana-Champaign
Aviation Research Laboratory
Willard Airport
Savoy, Illinois 61874
(217) 333-7749

Degree: Ph.D., Psychology, 1984
Specialty: Human Performance and Engineering Psychology
Assigned: AMRL

Dr. John Fleming
Assistant Professor
Texas A&M University
Dept. of Electrical Engr.
College Station, Texas 77843
(409) 845-7441

Degree: Ph.D. Electrical Engineering, 1977
Specialty: Systems, Control, Applied Mathematics, and Digital Signal Processing
Assigned: RADC

Dr. Dennis Flentge
Assistant Professor
Cedarville College
Math and Science Dept.
Cedarville, Ohio 45314
(513) 766-2211

Degree: Ph.D., Physical Chemistry, 1974
Specialty: Catalysis, Infrared Spectroscopy
Assigned: AFWAL/APL

Dr. Bessie Foster
Professor
Grambling State University
Department of Physics
Grambling, Louisiana 71245
(318) 274-2574

Degree: Ph.D., Science, Radiological Science, 1968
Specialty: Radiological Science (Health Physics and Radiation Biology)
Assigned: WL

Dr. James Gallas
Assistant Professor
University of Texas
1604 Loop/Rt. 10
San Antonio, Texas 78250
(512) 691-5446

Degree: Ph.D., Physics, 1981
Specialty: Interaction of Light (lasers) with Biological and Polymeric Materials
Assigned: SAM

Dr. Chester Gardner
Professor
University of Illinois
Electrical and Computer Engr.
1406 W. Green
Urbana, Illinois 61801
(217) 333-4682

Degree: Ph.D., Electrical Engineering, 1973
Specialty: Laser Remote Sensing, Optical Communications, Fiber Optics
Assigned: AFGL

Dr. Doris Ginn
Associate Professor
Jackson State University
English Department
1400 John R. Lynch Street
Jackson, Mississippi 39217
(601) 968-2116

Degree: Ph.D., Linguistics, 1979
Specialty: English as a Second Language and Sociolinguistics
Assigned: WL

Dr. Ramana Grandhi
Assistant Professor
Wright State University
Mechanical Systems Engineering
School of Engineering
Dayton, Ohio 45435
(513) 873-2079

Degree: Ph.D., Engineering Mechanics, 1984
Specialty: Structural Optimization
Assigned: AFWAL/FDL

Dr. Alwin Green
Associate Professor
State University College - Buffalo
Mathematics Department
1300 Elmwood Avenue
Buffalo, New York 14222
(716) 878-4420

Degree: Ph.D., Mathematics, 1972
Specialty: Graph Theory, Networks, Combinatorics, Mathematics Modeling
Assigned: RADC

Mr. Mahesh Greywall
Professor
Wichita State University
Mechanical Engineering Dept.
Box 35
Wichita, Kansas 67208
(316) 689-3402

Degree: Ph.D., Mechanical Engineering, 1962
Specialty: Fluid Mechanics
Assigned: AFWAL/APL

Dr. Vijay Gupta
Associate Professor
Central State University
Chemistry Department
Wilberforce, Ohio 45384
(513) 376-6423

Degree: Ph.D., Chemistry, 1969
Specialty: Physical Chemistry
Assigned: AFWAL/ML

Dr. Barry Haack
Associate Professor
Ball State University
Dept. of Geography
Muncie, Indiana 47306
(317) 285-1776

Degree: Ph.D. Geography, 1977
Specialty: Digital Processing of Remotely Sensed Data
Assigned: RADC

Dr. Je-Chin Han
Associate Professor
Texas A&M University
Mechanical Engr. Department
College Station, Texas 77843
(409) 845-3738

Degree: Sc.D., Mechanical Engineering Heat Transfer, 1976
Specialty: Heat Transfer
Assigned: AFWAL/APL

Dr. Donald Hanson
Associate Professor
University of Mississippi
Electrical Engineering Dept.
University, Mississippi 38677
(601) 232-5389

Degree: Ph.D., Electromagnetics, 1976
Specialty: Electromagnetic Field Theory and MOSFET VLSI Design
Assigned: RADC

Dr. David Hart
Assistant Professor
University of Florida
Dept. of Mathematics
201 Walker Hall
Gainesville, Florida 32611
(904) 392-6162

Degree: Ph.D., Mathematics, 1980
Specialty: Nonlinear Differential Equations
Assigned: AFWAL/FDC

Dr. Albert Heaney
Professor
California State University
Electrical Engineering Dept.
Shaw and Cedar Avenues
Fresno, California 93740
(209) 294-2157

Degree: Ph.D. Electrical Engineering, 1972
Specialty: Computer Engineering
Assigned: RADC

Dr. Carolyn Heising
Associate Professor
Northeastern University
Industrial Engineering Dept.
360 Huntington Ave.
Boston, Massachusetts 02115
(617) 437-4948

Degree: Ph.D., Mechanical Engineering, 1978
Specialty: Reliability Analysis/Risk Assessment
Assigned: ESD

Dr. Troy Henson
Associate Professor
Louisiana Tech University
Electrical Engr. Dept.
Tech Station
Ruston, Louisiana 71272
(318) 257-4715

Degree: Ph.D. Electrical Engineering, 1975
Specialty: Communications and Control Systems Theory, Digital Signal Processing
Assigned: AMRL

Dr. Astor Herrell
Professor and Chairman
Winston-Salem State University
P. O. Box 13236
Winston-Salem, North Carolina 27110
(919) 761-2098

Degree: Ph.D., Inorganic Chemistry, 1973
Specialty: Chemistry and Physical Science
Assigned: AEDC

Dr. Albert Hsui
Associate Professor
University of Illinois
Dept. of Geology
245 Nat. Hist. Bldg.
1301 W. Green Street
Urbana, Illinois 61801
(217) 333-7732

Degree: Ph.D., Geophysics and Mechanics, 1972
Specialty: Geophysics, Applied Mathematics, Computer Simulation
Assigned: AFGL

Dr. Clifford Johnston
Assistant Professor
University of Florida
Soil Science
2169 McCarty Hall
Gainesville, Florida 32611
(904) 392-1951

Degree: Ph.D., Soil Physical Chemistry, 1983
Specialty: Vibrational Spectroscopy (laser Raman and FTIR)
Assigned: ESC

Dr. Betty Jones
Associate Professor and
Director of the Institute
of Electron Microscopy
Morehouse College
Department of Biology
830 Westview Drive, S.W.
Atlanta, Georgia 30314
(404) 681-2800

Degree: Ph.D., Biology, 1978
Specialty: Medical Parasitology
Tropical Medicine and
Electron Microscopy
Assigned: SAM

Dr. Jeremy Jones
Assistant Professor
The University of West Florida
Systems Science Department
Pensacola, Florida 32514-0103
(904) 474-2551

Degree: M.S., Physics, 1970
Specialty: Artificial Intelligence,
Computer Science Department
Assigned: AFWAL/AL

Dr. Patrick Jones
Assistant Professor
The Ohio State University
Chemistry Department
140 W. 18th Avenue
Columbus, Ohio 43210
(614) 422-9489

Degree: Ph.D., Chemical Physics,
1980
Specialty: Chemical Dynamics
Assigned: AFWAL/AL

Dr. Walter Jones
Assistant Professor
University of Tennessee
Dept. of Engineering Science
and Mechanics
310 Perkins Hall
Knoxville, Tennessee 37996-2030
(615) 974-7684

Degree: Ph.D., Engineering
Mechanics, 1982
Specialty: Mechanics of Composite
Materials
Assigned: AFWAL/FDL

Dr. Prasad Kadaba
Professor
University of Kentucky
Electrical Engineering Dept.
Room 453 Anderson Hall
Lexington, Kentucky 40506
(606) 257-2966

Degree: Ph.D., Physics, 1950
Specialty: Dielectric Relaxation
and Magnetic Resonance:
Microwave and Millimet
Wave Measurements
Assigned: AFWAL/ML

Dr. James Kane
Associate Professor
Wright State University
Chemistry Department
Dayton, Ohio 45435
(513) 873-2352

Degree: Ph.D., Chemistry, 1960
Specialty: Organic, Physical Organic,
Polymer Chemistry
Assigned: AFWAL/ML

Dr. Amir Karimi
Assistant Professor
University of Texas
San Antonio
Division of Engineering
San Antonio, Texas 78285
(512) 691-5514

Degree: Ph.D. Mechanical Engineering, 1982
Specialty: Thermal Sciences, Condensation, Heat Exchanger Design, Heat Transfer, Phase Change Processes, Metastable Thermodynamics
Assigned: SAM

Dr. Daisy Kimble
Instructor
Southern University
Chemistry Department
P. O. Box S.U.
Baton Rouge, Louisiana 70813
(504) 771-3990

Degree: B.S., Chemistry, 1974
Specialty: Chemistry-Analytical
Assigned: FJSRL

Dr. David Kohfeld
Professor
Southern Illinois University
at Edwardsville
Edwardsville, Illinois 62026
(618) 692-2582

Degree: Ph.D., Experimental Psychology, 1966
Specialty: Human Performance and Reaction Time, Math Models
Assigned: HRL/OT

Dr. Stephan Kolitz
Assistant Professor
University of Massachusetts
Boston
Harbor Campus
Boston, Massachusetts 02125
(617) 929-8051

Degree: Ph.D. Industrial Engineering, 1983
Specialty: Operations Research
Assigned: ESD

Dr. Lawrence Koons
Professor
Tuskegee Institute
Chemistry Department
Tuskegee Institute, Alabama 36088
(205) 727-8835

Degree: Ph.D., Physical Chemistry, 1956
Specialty: Electrochemistry
Assigned: FJSRL

Dr. Arthur Kovitz
Professor
Northwestern University
Mechanical and Nuclear Engr.
2145 Sheridan Road
Evanston, Illinois 60201
(312) 491-7066

Degree: Ph.D., Aerospace Engineering, 1957
Specialty: Fluid Mechanics, (Interfaces, Combustion, Computation)
Assigned: WL

Dr. Kurt Kraiger
Assistant Professor
University of Colorado
at Denver
Department of Psychology
1100 14th Street
Denver, Colorado 80202
(303) 556-8351

Degree: Ph.D., Industrial/Organizational Psychology, 1983
Specialty: I/O Psychology, Performance Appraisal, Job Attitudes, Meta-Analysis
Assigned: HRL/MO

Dr. Madakasira Krishna
Professor
South Carolina State College
Mathematics and Computer Science
Box 1814, State College
Orangeburg, Souch Carolina 29117
(803) 536-7120

Degree: Ph.D., Numerical Analysis, Fluid Mechanics Computer Science, 1974
Specialty: Computational Fluid Mechanics, Numerical Analysis, Pde
Assigned: AD

Dr. Paul Lee
Associate Professor
North Carolina A&T State Univ.
Dept. of Business Administration
Greensboro, North Carolina 27411
(919) 379-7744

Degree: Ph.D., Resource Economics, 1973
Specialty: Statistics, Management Science and Computer Sciences
Assigned: LMDC

Dr. Benjamin Lev
Professor and Chairman
Temple University
Department of Management
School of Business Admin.
Philadelphia, Pennsylvania 19122
(215) 787-8188

Degree: Ph.D., Operations Research, 1970
Specialty: Production Management, Mathematical Programming
Assigned: RADC

Dr. Edward Lewis
Professor
Belmont College
Computer Information Systems/
Management Science
1900 Belmont Blvd.
Nashville, Tennessee 37203
(615) 383-7001

Degree: Ph.D., Met. Science (Operations Research and Statistics), 1978
Specialty: Mathematical Modeling, Decision Support, Statistical Analysis
Assigned: LMC

Dr. Michael Lewis
Assistant Professor
Troy State University
CIS Department
Troy, Alabama 36082
(205) 566-3000

Degree: M.S., Computer and Information Science, 1985
Specialty: Advanced Microcomputer Applications
Assigned: LMC

Dr. Philip Lewis
Professor
Auburn University
Department of Psychology
Auburn University, Alabama 36849
(205) 826-4424

Degree: Ph.D., Clinical Psychology, 1968
Specialty: Marital Dynamics, Personality Development, Leadership
Assigned: LMDC

Dr. Irene Little-Marenin
Assistant Professor
Wellesley College
Astronomy Department
Whitin Observatory
Wellesley, Massachusetts 02181
(617) 325-0320

Degree: Ph.D., Astrophysics, 1970
Specialty: Astrophysics, Cool Stars
Assigned: AFGL

Dr. Dar-Biau Liu
Associate Professor
Old Dominion University
Dept. of Computer Sciences
Norfolk, Virginia 23508
(804) 440-3901

Degree: Ph.D., Applied Mathematics and Computer Sciences, 1972
Specialty: Computer Science
Assigned: RADC

Dr. Carl Looney
Associate Professor
University of Nevada
EE/Computer Science Dept.
Reno, Nevada 89557-0030
(702) 784-6918

Degree: Ph.D., Mathematic Analysis, 1972
Specialty: Artifical Intelligence, Tracking, Filtering
Assigned: AFWAL/AL

Dr. James Marsh
Associate Professor
University of West Florida
Department of Physics
Pensacola, Florida 32514
(904) 474-2270

Degree: Ph.D., Physics, 1966
Specialty: Optics (Physical), Electromagnetic Theory
Assigned: AD

Dr. Charles Mastin
Professor
Mississippi State University
Mathematics and Stat. Dept.
Drawer MA
Mississippi State, Mississippi 39762
(601) 325-3414

Degree: Ph.D., Mathematics, 1969
Specialty: Computational Fluid Dynamics
Assigned: AEDC

Dr. Odis McDuff
Professor
The University of Alabama
Electrical Engineering
P. O. Box 6169
University, Alabama 35486
(205) 348-6351

Degree: Ph.D., Electrical Engineering, 1966
Specialty: Lasers and Optics, Electromagnetics
Assigned: SAM

Mr. Bernard McIntyre
Associate Professor
University of Houston
Electrical Electronics Dept.
University Park
4800 Calhoun St.
Houston, Texas 77004
(713) 749-4753

Degree: Ph.D., Solid State Physics, 1970
Specialty: Space Plasma Physics
Assigned: AFGL

Dr. Leathem Mehaffey
Associate Professor
Vassar College
Biology Department
Box 410
Poughkeepsie, New York 12601
(914) 452-7000

Degree: Ph.D., Biophysics, 1971
Specialty: Neurobiology and Physiology of Vision
Assigned: SAM

Dr. Ivor Mitchell
Professor
Marketing Department
Atlanta University
223 Chestnut Street, S.W.
Atlanta, Georgia 30337
(404) 681-0251

Degree: Ph.D., Marketing and Statistics, 1977
Specialty: Marketing, Statistics
Assigned: LMDC

Dr. James Moore
Professor
University of Arkansas
Civil Engineering Dept.
Fayetteville, Arizona 72701
(501) 575-6027

Degree: Ph.D., Environmental Health Engineering, 1972
Specialty: Environmental Engineering
Assigned: ESC

Dr. Osoma Mostafa
Associate Professor
California State University
Electronics Engineering Dept.
C. S. U. C. #930
Chico, California 95929
(916) 895-5374

Degree: Ph.D., Electrical Engineering, 1975
Specialty: Systems, Automation, Artificial Intelligence
Assigned: AD

Dr. Rex Moyer
Associate Professor
Trinity University
Biology Department
715 Stadium Drive
San Antonio, Texas 78284
(512) 736-7242

Degree: Ph.D., Microbiology, 1965
Specialty: Molecular Biology, Experimental Oncology
Assigned SAM

Dr. James Mrotek
Associate Professor
Meharry Medical College
Department of Physiology
1005 D. B. Todd Blvd.
Nashville, Tennessee 37208
(615) 327-6979

Degree: Ph.D., Biology, 1973
Specialty: Environmental Influences on Cultured Mammalian Cells, Endocrine Cell Intracellular Exchanges
Assigned: SAM

Dr. Maurice Neveu
Associate Professor
State University College of N.Y.
Chemistry Department
Fredonia, New York 14063
(716) 673-3285

Degree: Ph.D., Physical-Organic Chemistry, 1959
Specialty: Physical-Organic Chemistry, Synthetic Organic Chemistry, Chemical Kinetics, Reaction Mechanisms, Explosives, Aviation Fuels
Assigned: AD

Dr. Robert Niebuhr
Associate Professor
Auburn University
Dept. of Management
Auburn, Alabama 36849
(205) 826-4591

Degree: Ph.D., Management, 1977
Specialty: Management Processes, Organizational Behavior
Assigned: LMDC

Dr. Marion Noble
Professor
Kansas State University
Physical Education Dept.
203 Ahearn Gym
Manhattan, Kansas 66506
(913) 532-6765

Degree: Ph.D., Biomechanics, 1970
Specialty: Biomechanics
Assigned: AMRL

Dr. Robert O'Connell
Assistant Professor
University of Missouri-Columbia
Electrical and Engr. Dept.
Columbia, Missouri 65211
(314) 882-8373

Degree: Ph.D., Electrical Engineering, 1975
Specialty: Applied Optics, Laser Effects
Assigned: FJSRL

Dr. Ralph Oberly
Professor and Chairman
Marshall University
Physics Department
Huntington, West Virginia 25701
(304) 696-6738

Degree: Ph.D., Physics (Molecular Spectra), 1970
Specialty: Molecular Spectroscopy, Optical Devices
Assigned: AFWAL/APL

Dr. Won Park
Professor
Wright State University
Mathematics and Statistics Dept.
Dayton, Ohio 45435
(513) 873-2837

Degree: Ph.D., Mathematics, 1969
Specialty: Stochastic Processes, Time Series, Reliability
Assigned: AFWAL/AL

Dr. Desmond Penny
Assistant Professor
Southern Utah State College
Physical Science Department
Cedar City, Utah 84720
(801) 586-7708

Degree: Ph.D., Civil Engineering, 1975
Specialty: Continuum Mechanics
Assigned: ESC

Dr. John Pierce
Associate Professor
University of North Alabama
Department of Chemistry
Florence, Alabama 35632
(205) 766-4100

Degree: Ph.D., Environmental Health, 1978
Specialty: Thermal Absorption of Toxicants, Analytical Methods Development
Assigned: OEHL

Dr. Boake Plessy
Profes[illegible]
Dillard University
Division of Natural Science
2601 Gentilly Blvd.
New Orleans, Louisiana 70122
(504) 283-8822

Degree: Ph.D., Physical Chemistry, 1974
Specialty: Biopolymers, Proteoglycans from Corneal Tissue
Assigned: SAM

Dr. Arnold Polak
Professor
University of Cincinnati
Dept. of Aerospace Engr. and Engr. Mechanics
ML 70
Cincinnati, Ohio 45221
(513) 475-5133

Degree: Ph.D., Aerospace Engineering, 1966
Specialty: Fluid Mechanics
Assigned: AFWAL/APL

Dr. Justin Poland
Associate Professor
University of Maine Orono
Mechanical Engineering Dept.
209 Boardman Hall
Orono, Maine 04469
(207) 581-2123

Degree: Ph.D., Mechanical Engineering, 1979
Specialty: Thermal Sciences, Thermodynamics, Heat Transfer, Fluid Mechanics
Assigned: AEDC

Dr. Kuldip Rattan
Associate Professor
Wright State University
Electrical Systems Engineering Department
Fawcett Hall, Room 354
Dayton, Ohio 45435
(513) 873-2497

Degree: Ph.D., Electrical Engineering, 1975
Specialty: Digital Control Systems
Assigned: AFWAL/FDL

Dr. Hemen Ray
Assistant Professor
North Carolina A&T State Univ.
Mechanical Engr. Dept.
112 Cherry Hall
Greensboro, North Carolina 27411
(919) 379-7621

Degree: Ph.D., Engineering Mechanics, 1979
Specialty: Advanced Composites
Assigned: AFWAL/FDL

Dr. John Renie
Assistant Professor
University of Illinois
Dept. of Mechanical and Industrial Engineering
1206 W. Green Street
Urbana, Illinois 61801
(217) 333-6199

Degree: Ph.D., Combustion/ Engineering, 1982
Specialty: Combustion and Fluid Dynamics
Assigned: RPL

Dr. Michael Rhodes
Instructor
Clark College
Department of Physics
240 Brawley Drive, S.W.
Atlanta, Georgia 30314
(404) 681-3080

Degree: Ph,D., Physics, 1983
Specialty: Plasma Physics, Numerical Analysis
Assigned: AFGL

Dr. Robert Ricci
Professor and Chairman
Holy Cross College
Chemistry Department
Worcester, Massachusetts 01610
(617) 793-3380

Degree: Ph.D., Chemistry, 1961
Specialty: Physical Chemistry, Analytical Chemistry
Assigned: AFGL

Dr. James Riehl
Associate Professor
University of Missouri
Department of Chemistry
8001 Natural Bridge Road
St. Louis, Missouri 63121
(314) 553-5328

Degree: PH.D., Physical Chemistry, 1975
Specialty: Physical Chemistry, Theoretical Chemistry, Laser, Spectroscopy
Assigned: AFGL

Dr. Michael Ross
Associate Professor
Slippery Rock University
Computer Science Department
Slippery Rock, Pennsylvania 16057
(412) 794-7133

Degree: Ph.D., Applied Mathematics,
Specialty: Computer Simulation, Operating Systems, Numerical Analysis
Assigned: AMRL

Dr. Samuel Russell
Assistant Professor
University of South Carolina
Mechanical Engineering Dept.
Columbia, South Carolina 29208
(803) 777-3241

Degree: Ph.D., Engrineering Mechanics, 1982
Specialty: Nondestructive Testing of Composite Materials
Assigned: AFWAL/ML

Dr. Sally Sage
Assistant Professor
West Georgia College
Department of Math
and Computer Science
Carrollton, Georgia 30118
(404) 834-1380

Degree: M.S., Computer Science, 1979
Specialty: Programming Languages and Computer Simulation
Assigned: AD

Dr. Joseph Saliba
Assistant Professor
University of Dayton
Civil Engr. Dept.
300 College Park
Dayton, Ohio 45469
(513) 229-3847

Degree: Ph.D., Solid Mechanics, 1983
Specialty: Solid Mechanics - Structures
Assigned: AFWAL/FDL

Dr. Gordon Schrank
Associate Professor
St. Cloud State University
Dept. of Biology Sciences
St. Cloud, Minnesota 56301
(612) 255-2036

Degree: Ph.D., Medical Microbiology, 1974
Specialty: General Microbiology, Medical Microbiology, Electron Microscopy
Assigned: SAM

Dr. Ronald Sega
Assistant Professor
University of Colorado
Department of Electrical Engr.
Colorado Springs, Colorado 80933-7150
(303) 593-3510

Degree: Ph.D., Electrical Engineering, 1982
Specialty: Electromagnetics
Assigned: FJSRL

Dr. Paul Seybold
Professor
Wright State University
Chemistry Department
Dayton, Ohio 45435
(513) 873-2407

Degree: Ph.D., Biophysics, 1968
Specialty: Structure-Activity Relations
Assigned: AMRL

Dr. Shawky Shamma
Professor
University of West Florida
Pensacola, Florida 32504
(904) 474-2281

Degree: Ph.D., Applied Mathematics,
Specialty: Applied Mathematics
Assigned: AD

Dr. Ralph Sheets
Professor
Southwest Missouri State Univ.
Department of Chemistry
Springfield, Missouri 65804
(417) 836-5611

Degree: Ph.D., Physical Chemistry, 1971
Specialty: Chemistry (surface chemistry and catalysis environmental)
Assigned: OEHL

Dr. Kyle Siegrist
Assistant Professor
University of Alabama
Mathematics Department
Huntsville, Alabama 35899
(205) 895-6470

Degree: Ph.D., Applied Mathematics, 1979
Specialty: Probability and Stochastic Processes
Assigned: RADC

Dr. Ricardo Silva
Professor
California State University
18111 Nordhoff Street
Northridge, California 91330
(818) 885-3378

Degree: Ph.D., Chemistry, 1961
Specialty: Organic Chemistry, Synthesis and Analysis
Assigned: RPL

Dr. S. Ballou Skinner
Professor
University of South Carolina
Coastal Carolina College
Physics Department
P. O. Box 1954
Conway, South Carolina 29526
(803) 347-3161

Degree: Ph.D., Physics, 1970
Specialty: Nuclear and Radiation Physics, Gamma Ray Spectroscopy, Neutron Activation Analysis
Assigned: AEDC

Dr. Terrill Smith
Professor
Central State University
Chemistry Department
100 N. University Drive
Edmond, Oklahoma 73034
(405) 341-2980

Degree: Ph.D., Organic Chemistry, 1959
Specialty: Organic, Polymer, Fluorine, Industrial Chemistry
Assigned: AFWAL/ML

Dr. Siavash Sohrab
Assistant Professor
Northwestern University
MNE Department
Technical Institute
Evanston, Illinois 60201
(312) 491-3572

Degree: Ph.D., Engineering Physics, 1981
Specialty: Combustion
Assigned: RPL

Dr. Richard Stebbins
Assistant Professor
University of Southern Maine
Chemistry Department
96 Falmouth Street
360 Science Building
Portland, Maine 04103
(207) 780-4232

Degree: Ph.D., Physical Chemistry, 1970
Specialty: Analysis of Trace Organics by ECD Gas Chromatography
Assigned: OEHL

Dr. Bob Stewart
Assistant Professor
University of Cincinnati
Dept. of Mechanical Engr.
M.L. #72
Cincinnati, Ohio 45221
(513) 475-4781

Degree: Ph.D., Physics, 1981
Specialty: General Relativity, Thermodynamics, Biomechanics
Assigned: WL

Dr. Lowell Stockstill
Assistant Professor
Wittenberg University
Dept. of Business Administration
P. O. Box 720
Springfield, Ohio 45501
(513) 327-7903

Degree: J.D./MBA, Law, 1982
Specialty: Small Business Law
Assigned: BRMC

Dr. William Stone
Assistant Professor
Meharry Medical College
Dept. of Pediatrics
Nashville, Tennessee 37208
(615) 327-6506

Degree: Ph.D., Molecular and Cellular Biology, 1973
Specialty: Lipid Biochemistry, Nutrition, Hyperbaric Medicine
Assigned: SAM

Dr. James Sturm
Professor
Lehigh University
Department of Chemistry #6
Bethlehem, Pennsylvania 18015
(215) 861-3477

Degree: Ph.D., Physical Chemistry, 1957
Specialty: Photochemical Kinetics
Assigned: AFGL

Dr. Thomas Sudkamp
Assistant Professor
Wright State University
Computer Science Department
Dayton, Ohio 45435
(513) 873-2491

Degree: Ph.D., Mathematics, 1978
Specialty: Computer Science, Mathematics
Assigned: AFWAL/AL

Dr. William Sutton
Assistant Professor
University of Oklahoma
School of Aerospace
Mechanical and Nuclear Engr. Department
865 Asp Ave., Rm. 212
Norman, Oklahoma 73019
(405) 325-5011

Degree: Ph.D., Mechanical Engineering, 1981
Specialty: Heat Transfer, Thermal Radiation
Assigned: AEDC

Dr. Robert Swanson
Assistant Professor
Virginia Polytechnic Institute and State University
Materials Engineering Dept.
Blacksburg, Virginia 24061
(703) 961-5600

Degree: Ph.D., Metallurgical Engineering and Materials Science, 1983
Specialty: Fracture Mechanics, Environmental Cracking, Corrosion
Assigned: AFWAL/ML

Dr. Patrick Sweeney
Professor
University of Dayton
Engineering Management and Systems Dept.
KL 361
Dayton, Ohio 45469
(513) 229-2238

Degree: Ph.D., Mechanical Engineering, 1977
Specialty: Simulation, Costing, Management Systems
Assigned: BRMC

Dr. Charles Taylor
Professor
University of Florida
Dept. of Engineering Science
231 Aerospace Eng. Building
Gainesville, Florida 32611
(904) 392-0961

Degree: Ph.D., Theory and Application Mechanics, 1953
Specialty: Optical Methods of Experimental Stress Analysis
Assigned: AD

Dr. Joseph Tedsco
Assistant Professor
Auburn University
Dept. of Civil Engineering
210 Ramsay Hall
Auburn, Alabama 36849
(205) 826-4320

Degree: Ph.D., Civil Engineering, 1982
Specialty: Structural Dynamics; Concrete Structures
Assigned: ESC

Dr. Walter Trafton
Associate Professor
Gallaudet College
Chemistry Department
Kendall Green
Washington D.C. 20002
(202) 651-5536

Degree: Ph.D., Chemistry, 1973
Specialty: Physical Chemistry, Kinetics and Gas Phase Reactions
Assigned: FJSRL

Dr. Larry Vardiman
Associate Professor and
Dept. Chairman
Christian Heritage College
Physical Sciences Dept.
2100 Greenfield Drive
El Cajon, California 92021
(619) 440-3043

Degree: Ph.D., Atmospheric Science, 1974
Specialty: Cloud Physics and Weather Modification
Assigned: AFGL

Dr. Daniel Voss
Assistant Professor
Wright State University
Dept. of Math and Stat.
Dayton, Ohio 45435
(513) 873-2958

Degree: Ph.D., Statistics, 1984
Specialty: Experimental Design, Confounding in Factorial Exper's
Assigned: LC

Dr. Christian Wagner
Assistant Professor
Oakland University
School of Engineering and
Computer Science
138 Dodge Hall
Rochester, Michigan 48063
(313) 370-2215

Degree: Ph.D., Educational Psychology and Artificial Intelligence, 1982
Specialty: Artificial Intelligence, Cognitive Psychology
Assigned: HRL/IO

Dr. Richard Walker
Chairman
Miami University
Aeronautics Department
219 Culler Hall
Oxford, Ohio 45056
(513) 529-5919

Degree: Ph.D., Aerospace Engineering, 1970
Specialty: Aircraft Design, Performance Analysis, Propulsion Aerodynamics
Assigned: AFWAL/FDL

Dr. Doris Walker-Dalhouse
Director of Independent/Home Study Programs
Associate Professor of Reading
Jackson State University
P. O. Box 17120
Jackson, Mississippi 39217
(601) 968-2378

Degree: Ph.D., Reading Education, 1977
Specialty: Education
Assigned: WL

Dr. Yin-min Wei
Professor
Ohio University
Computer Science Dept.
Morton Hall 573
Athens, Ohio 45701
(614) 594-6574

Degree: Ph.D., Electrical Engineering, 1966
Specialty: Signal Processing
Assigned: AMRL

Dr. Isaac Weiss
Associate Professor
Wright State University
School of Engineering
Dayton, Ohio 45435
(513) 873-3021

Degree: Ph.D., Metallurgy, 1978
Specialty: Thermomechanical Processing, Deformation Processing
Assigned: AFWAL/ML

Dr. Shih-sung Wen
Professor
Jackson State University
Psychology Department
1325 J. R. Lynch Street
Jackson, Mississippi 39217
(601) 968-2371

Degree: Ph.D., Educational Psychology, 1971
Specialty: Cognitive Psychology, Psychological Testing, Statistics
Assigned: SAM

Dr. David Wilson
Associate Professor
University of Florida
Mathematics Department
311 Walker Hall
Gainesville, Florida 32611
(904) 392-6035

Degree: Ph.D., Mathematics, Rutgers, 1969
Specialty: Geometric Topology, Grid Generation (Computer Flight Dynamics)
Assigned: AD

Dr. Jesse Williams
Associate Professor
Cheyney University
Math/CIS Department
Cheyney, Pennsylvania 19319
(215) 399-2348

Degree: M.B.A., Computer Science, 1975
Specialty: Computer Science
Assigned: LMC

Dr. Arthur Woodrum
Head, Dept. of Physics
Georgia Southern College
Landrum Box 8031
Statesboro, Georgia 30460
(912) 681-5292

Degree: Ph.D., Physics, 1968
Specialty: Atmospheric Physics
Assigned: SAM

Dr. Billy Wooten
Associate Professor
Brown University
Psychology Department
89 Waterman Street
Providence, Rhode Island 02912
(401) 863-2330

Degree: Ph.D., Experimental Psychology, 1970
Specialty: Color Vision
Assigned: HRL/OT

Dr. Carl Wulfman
Chairman
University of the Pacific
Department of Physics
Stockton, California 95211
(209) 946-2220

Degree: Ph.D., Organic Chemistry, 1957
Specialty: Chemical Physics
Assigned: FJSRL

Dr. Hsi-Han Yeh
Associate Professor
University of Kentucky
Dept. of E.E.
Lexington, Kentucky 40506
(606) 257-4289

Degree: Ph.D., Electrical Engineering, 1967
Specialty: Multivariable Control
Assigned: AFWAL/FDL

Dr. Juin Yu
Professor
West Virginia Institute
of Technology
Mechanical Engineering Department
Montgomery, West Virginia 25136
(304) 442-3248

Degree: Ph.D., Mechanical Engineering
Specialty: Thermofluid Processes
Assigned: AEDC

APPENDIX II C

PARTICIPANT LABORATORY ASSIGNMENT

C. PARTICIPANT LABORATORY ASSIGNMENT (Page 1)

1985 USAF/UES SUMMER FACULTY RESEARCH PROGRAM

AERO PROPULSION LABORATORY (AFWAL/APL)
(Wright-Patterson Air Force Base)

1. Lea Der Chen
2. Louis C. CHow
3. Leroy E. Eimers
4. John E. Erdei
5. Dennis R. Flentge
6. Mahesh S. Greywall
7. Je-Chen Han
8. Ralph E. Oberly
9. Arnold Polak

AEROSPACE MEDICAL RESEARCH LABORATORY (AMRL)
(Wright-Patterson Air Force Base)

1. Samuel K. Adams
2. Zinny S. Bond
3. Charles B. Davis
4. John M. Flach
5. Troy F. Henson
6. Marion L. Noble
7. Michael D. Ross
8. Paul G. Seybold
9. Yin-min Wei

ARMAMENT LABORATORY (AD)
(Eglin Air Force Base)

1. Kevin W. Bowyer
2. Madakasira V. Krishna
3. James S. Marsh
4. Osana M. Mostafa
5. Maurice C. Neveu
6. Sally A. Sage
7. Shawky E. Shamma
8. Charles E. Taylor
9. David C. Wilson

ARNOLD ENGINEERING DEVELOPMENT CENTER (AEDC)
(Arnold Air Force Station)

1. Astor Y. Herrell
2. Charles W. Mastin
3. Justin H. Poland
4. S. Ballou Skinner
5. William H. Sutton
6. Juin S. Yu

AVIONICS LABORATORY (AFWAL/AL)
(Wright-Patterson Air Force Base)

1. Rex Barney
2. Jharna Chaudhuri
3. Alvin Compaan
4. Patrick Jones
5. Jeremy Jones
6. Carl Looney
7. Won Park
8. Thomas Sudkamp

BUSINESS RESEARCH MANAGEMENT CENTER (BRMC)
(Wright-Patterson Air Force Base)

1. Lowell E. Stockstill
2. Patrick J. Sweeney

C. PARTICIPANT LABORATORY ASSIGNMENT (Page 2)

ELECTRONICS SYSTEMS DIVISION (ESD)
(Hanscom Air Force Base)

1. Carolyn D. Heising
2. Stephan E. Kolitz

ENGINEERING AND SERVICES CENTER (ESC)
(Tyndall Air Force Base)

1. Karen Chai-Kwan Chou
2. Gale J. Clark
3. Clifford T. Johnston
4. Desmond N. Penny
5. Joseph W. Tedesco

FLIGHT DYNAMICS LABORATORY (AFWAL/FDL)
(Wright-Patterson Air Force Base)

1. Connie K. Carrington
2. Robert R. Chamberlain
3. Dah-Nien Fan
4. ramana V. Grandhi
5. David C. Hart
6. Walter F. Jones
7. Kuldip S. Rattan
8. Hemen Ray
9. Joseph E. Saliba
10. Richard C. Walker
11. Hsi-Han Yeh

FRANK J. SEILER RESEARCH LABORATORY (FJSRL)
(USAF Academy)

1. Richard D. Bertrand
2. Hermann J. Donnert
3. Harry W. Emrick
4. Daisy W. Kimble
5. Lawrence F. Koons
6. Ronald M. Sega
7. Walter E. Trafton, Jr.
8. Carl E. Wulfman

GEOPHYSICS LABORATORY (AFGL)
(Hanscom Air Force Base)

1. Lucia M. Babcock
2. Francesco L. Bacchialoni
3. Chester S. Gardner
4. Albert Tong-Kwan Hsui
5. Irene R. Little-Marenin
6. Bernard McIntyre
7. Michael B. Rhodes
8. Robert W. Ricci
9. James P. Riehl
10. James E. Strum
11. Larry Vardiman

HUMAN RESOURCES LABORATORY/LR (HRL/LR)
(Wright-Patterson Air Force Base)

1. Linda J. Buehner
2. Hobert H. Corley

HUMAN RESOURCES LABORATORY/OT (HRL/OT)
(Williams Air Force Base)

1. Thomas J. Connolly
2. David L. Kohfeld
3. Billy R. Wooten

C. PARTICIPANT LABORATORY ASSIGNMENT (Page 3)

HUMAN RESOURCES LABORATORY/MO (HRL/MO)
(Brooks Air Force Base)
1. Phillip L. Ackerman
2. Jihad A. Alsadek
3. Edna R. Fiedler
4. Kurt Kraiger

HUMAN RESOURCES LABORATORY/ID (HRL/ID)
(Lowry Air Force Base)
1. Peter J. Binkert
2. Christian C. Wagner

LEADERSHIP AND MANAGEMENT DEVELOPMENT CENTER (LMDC)
(Maxwell Air Force Base)
1. Paul S.T. Lee
2. Philip M. Lewis
3. Ivor S. Mitchell
4. Robert E. Niebuhr

LOGISTICS COMMAND (LC)
(Wright-Patterson Air Force Base)
1. Daniel T. Voss

LOGISTICS MANAGEMENT CENTER (LMC)
(Gunter Air Force Base)
1. Michael M. Lewis
2. Edward N. Lewis
3. Jesse Williams

MATERIALS LABORATORY (AFWAL/ML)
(Wright-Patterson Air Force Base)
1. Vernon R. Allen
2. Derald Chriss
3. Billy C. Covington
4. Parviz Dadras
5. Charles H. Drummond, III
6. Vijay K. Gupta
7. Prasad K. Kadaba
8. James J. Kane
9. Samuel S. Russell
10. Terrill D. Smith
11. Robert E. Swanson
12. Isaac Weiss

OCCUPATIONAL AND ENVIRONMENTAL HEALTH LABORATORY (OEHL)
(Brooks Air Force Base)
1. John T. Pierce
2. Ralph W. Sheets
3. Richard G. Stebbins

C. PARTICIPANT LABORATORY ASSIGNMENT (Page 4)

ROCKET PROPULSION LABORATORY (RPL)
(Edwards Air Force Base)

1. Dennis J. Cravens
2. Melvin L. Druelinger
3. John P. Renie
4. Ricardo A. Silva
5. Siavash H. Sohrab

ROME AIR DEVELOPMENT CENTER (RADC)
(Griffiss Air Force Base)

1. David B. Choate
2. David Y. Chung
3. David R. Cochran
4. John A. Fleming
5. Alwin C. Green
6. Barry N. Haack
7. Donald F. Hanson
5. Albert A. Heaney
6. Benjamin Lev
7. Dar-Biau Liu
8. Kyle T. Siegrist

SCHOOL OF AEROSPACE MEDICINE (SAM)
(Brooks Air Force Base)

1. Deborah L. Armstrong
2. Mukul R. Banerjee
3. Vito G. DelVecchio
4. Mack Felton
5. James M. Gallas
6. Betty R. Jones
7. Amir Karimi
8. Odis P. McDuff
9. Leathem Mehaffey
10. Rex C. Moyer
11. James J. Mrotek
12. Boake L. Plessy
13. Gordon D. Schrank
14. William L. Stone
15. Shih-sung Wen
16. Arthur Woodrum

WEAPONS LABORATORY (WL)
(Kirtland Air Force Base)

1. Eugene F. Brown
2. Hudson B. Eldridge
3. Bessie R. Foster
4. Doris O. Ginn
5. Arthur A. Kovitz
6. Robert M. O'Connell
7. Bob W. Stewart
8. Doris Walker-Dalhouse

APPENDIX III

A. Listing of Research Reports Submitted in the 1985 Summer Faculty Research Program

B. Abstracts of the 1985 Summer Fellow's Research Reports

APPENDIX III A

RESEARCH REPORTS

1985 SUMMER FACULTY RESEARCH PROGRAM

Technical Report Number	Title	Professor
Volume I		
1	Individual Differences in Abilities, Learning, and Cognitive Processes	Dr. Phillip L. Ackerman
2	Maximum Voluntary Hand Grip Torque for Circular Electrical Connectors	Dr. Samuel Adams
3	Properties and Processing of a Perfluorinated Polyalkylene Linked Polyimide	Dr. Vernon R. Allen
4	Quantifying Experience in the Cost of Human Capital	Dr. Jihad A. Alsadek
5	The Effects of Raphe Stimulation and Iontophoresis of Serotonergic Agents on Granule Cell Activity in Rat Lateral Cerebellar Cortex	Dr. Deborah Armstrong
6	Temperature Dependence of Ion-Molecule Association Reactions: Halide Ion Addition Reactions	Dr. Lucia Badcock
7	Active Control of Flexible Structures	Dr. Francesco Bacchialoni
8	Gas Exchange in the Rabbit Using High Frequency Ventilation in High Altitude	Dr. Mukul R. Banerjee
9	Computer Automated Test Mirror Registration System for the Ring Laser Gyro	Dr. Rex L. Berney
10	^{27}Al Spin Lattic Relaxation Measurements in Alkylammonium-Chloroaluminate Room-Temperature Electrolytes	Dr. Richard Bertrand
11	Natural Language Understanding Using Residential Grammar and It's Use in Automatic Programming	Dr. Peter J. Binkert
12	Speech Effects of High Sustained Acceleration: A Preliminary Study	Dr. Zinny S. Bond

13	Automatic Determination of Object Orientation in 2-D Images	Dr. Kevin W. Bowyer
14	Stimulation of Jet Injection Using RAVEN	Dr. Eugene F. Brown
15	The Impact of Cognitive Styles & Subject Matter on Instructional Design	Dr. Linda J. Buehner
16	Polynomial Feedback Control for Robotic Manipulators	Dr. Connie K. Carrington
17	Modification and Evaluation of Heat Transfer Calculations Using the AFWAL PNS Code	Dr. Robert R. Chamberlain
18	Optical and X-Ray Topographic Characterization of Undoped Simi-Insulating GaAs	Dr. Jharna Chaudhuri
19	Visualization of Jet Flames	Dr. Lea D. Chen
20	Splines and the Fourier Transform	Dr. David B. Choate
21	Protection From Nonnuclear Weapons: A Probabilistic Approach	Dr. Karen C. Chou
22	Fluid Recirculation, Deployment, and Retraction of the Expandable Radiator	Dr. Louis Chow
23	Applications of Internal Reflection Spectroscopy to the Characterization of Thermoset Polymers	Dr. Derald Chriss
24	Applications of Fiber Optics of Low Temperatures	Dr. David Y. Chung
25	Evaluation of Selected Parameters Which Affect K_d When Measured Using HPLC Instrumentation	Dr. Gale J. Clark
26	Dipole Moment of InP in the Melt	Dr. David R. Cochran
27	Laser Raman Laboratory Research	Dr. Alvin D. Compaan
28	Aeronautical Decision-Making for Air Force Pilots	Dr. Thomas J. Connolly
29	Feasibility Study on the Logistics Operational Assessment Model	Dr. Hobert H. Corley
30	Photo-Hall Study of Doped and Undoped Semi-Insulating GaAs.	Dr. Billy C. Covington

31	Spin Formed Mirrors	Dr. Dennis J. Cravens
32	High-Temperature Across-Ply Testing of C/C Composites	Dr. Parviz Dadras
33	Statistical Descriptions of Shape in R^2 and R^3	Dr. Charles B. Davis
34	An Assessment of the Development of a DNA Probe for Mycoplasma hominis and Ureaplasma urealyticum	Dr. Vito G. DelVecchio
35	Effects of Nuclear Radiation on the Optical Characteristics of Laser Components	Dr. Hermann J. Donnert
36	Energetic Materials via Alkoxy-fluorinations of Alkenes with Xenon Difluoride	Dr. Melvin Druelinger
37	Metal Alkoxide Synthesis of High Temperature Matrices	Dr. Charles H. Drummond
38	Computer Modeling of GaAs and AlAs-GaAs Solar Cells	Dr. Leroy E. Eimers
39	Analyzing Gamma Ray and Neutron Emission Spectra	Dr. Hudson B. Eldridge
40	Geophysical Perturbing Forces on the Frank J. Seiler Large Passive Resonant Ring Laser Gyro	Dr. Harry W. Emrick
41	Quasiparticles and the Transition to Turbulence	Dr. John E. Erdei
42	Statistical Biases in IRLV Measurements of Turbulent Flows	Dr. Dah-Nien Fan
43	Analytical Methods for the Determination of Cholesterol and Cholesterol Esters in Salivary Fluids	Dr. Mack Felton
44	Personality Correlates of Pilot Performance	Dr. Edna Fiedler
45	Transfer of Training Between Alternative Motion Simulators	Dr. John Flach
46	Control of Adaptive Optical Systems	Dr. John A. Fleming

47	Electrochemical Analysis of the Degradation of Synthetic Lubricants	Dr. Dennis R. Flentge
48	Induced Nuclear Radiation Dose in a Simulated Standard Man with Implications on Aircrew Survivability	Dr. Bessie Ruth Foster
49	Determination of Thermal Properties of Melanin Using Photoacoustic Techniques	Dr. James M. Gallas
50	Lidar Measurements of the Mesospheric Sodium Layer at the Air Force Geophysics Laboratory	Dr. Chester S. Gardner
51	AFWL History	Dr. Doris O. Ginn
Volume II		
52	Optimum Design of Structures with Multiple Constraints	Dr. Ramana Grandhi
53	Descriptive Exploration of Patterns in Optical Turbulence Profiles	Dr. Alwin C. Green
54	Modular Modeling of Solid-Fuel Ramjet Combustor Flow	Dr. Mahesh S. Greywall
55	Thermal Stability Characteristics of Some Advanced Synthetic Base Fluids	Dr. Vijay K. Gupta
56	Use of Texture Measures in Multispectral Scanner Data Numerical Classifications	Dr. Barry N. Haack
57	Effect of High Free-Stream Turbulence From a Free Jet on Flat Plate Turbulent Boundary Layer Flow and Heat Transfer	Dr. Je-chin Han
58	A Study of Coplanar Waveguide and its Application to Phased Arrays of Integrated Circuit Antennas	Dr. Donald F. Hanson
59	Three-Dimensional Grid Generation for High-Performance Aircraft	Dr. David Hart
60	Analysis of the Report on Filan Performance Metrics	Dr. Albert A. Heaney
61	Methods for Reliability Warranty Verification	Dr. Carolyn D. Heising

62	Artificial Intelligence and Robotics Perception System	Dr. Troy Henson
63	The Thermodynamic, Physical and Optical Properties of Aluminum Oxide	Dr. Astor Y. Herrell
64	Geoid Modelling and Interpretation	Dr. Albert T. Hsui
65	FTIR Spectroscopic Study of Hydrazine Interactions with Clay Minerals	Dr. Clifford T. Johnston
66	Experimental Studies Related to III-V Semiconductor Growth and Characterization	Dr. Patrick L. Jones
67	A Preliminary Study of Learning Nets and Massive Parallelism	Dr. Jeremy Jones
68	Approximate Mathematical Solutions for Unidirectional Composites Containing Broken Fibers	Dr. Walter F. Jones
69	Long Term Life Expectancy Radiation Effects: An Ultrastructural Study of Brain Tumors Developed in Macaca Mulatta following Exposure to Proton Radiation	Dr. Betty Jones
70	Design Considerations for Phase Dependent Voltage Contrast Technique for Application to SEM Analysis and Electrical and Optical and Characterization of Certain Doped Organic Polymers	Dr. Prasad K. Kadaba
71	Synthesis of Novel Polybenzimidazole Monomers	Dr. James J. Kane
72	A Thermal Evaluation of a Portable, Battery-Powered Vapor-Compression Colling System	Dr. Amir Karimi
73	Mechanistic Studies of Energetic Materials: Analysis of 2,4,6-Trinitrotoluene Thermal Decomposition Products	Dr. Daisy W. Kimble
74	Role of Stimulus Uncertainty in Visual Contrast Sensitivity	Dr. David Kohfeld
75	The Multi-Weapon Multi-Target Multi-Phase Assignment Problem	Dr. Stephan E. Kolitz

76	A Study of the Electrochemical Behavior of the Bromine/Bromide Couple in Melts Composed of Aluminum Chloride and 1-Methyl-3-Ethylimidazolium Chloride	Dr. Lawrence F. Koons
77	The Thermal Layer: A Simplified Model	Dr. Arthur Kovitz
78	Analysis of Relationships Among Self, Peer, and Supervisory Ratings of Performance	Dr. Kurt Kraiger
79	Numerical Study of Detonation Near a Barrier	Dr. Madakasira V. Krishna
80	Sampling Plan for the Organizational Assessment Package Survey	Dr. Paul S. T. Lee
81	Route Planning Problem	Dr. Benjamin Lev
82	Statistical Performance Measures: Relating Air Force Mission Capability to Base Supply Measures	Dr. Edward Lewis
83	Testing the Effectiveness of some User Friendly Algorithms	Dr. Michael Lewis
84	Family Factors and the Career Intent of Air Force Enlisted Personnel	Dr. Philip M. Lewis
85	An Analysis of Low Dispersion IRAS Spectra of Carbon Stars, S Stars and M Variable Stars	Dr. Irene R. Little-Marenin
86	Preliminary Investigation on Resource Control Strategies on Distributed Computer Systems Real-Time vs. Non-Real Time	Dr. Dar-Biau Liu
87	Modelling/Analysis of Space Based Kinetic Energy Weapon Projectile Elyouts	Dr. Carl G. Looney
88	Image Formation and Processing in Superposition Eyes: Precision Location of Point Objects Using the Moire Effect	Dr. James S. Marsh
89	Control Functions in Grid Generation	Dr. C. Wayne Mastin
90	Active Mode-Locking Techniques for Ultra-Short Pulses in Nd:YAG Lasers	Dr. Odis P. McDuff

91	Plasma Parameter Data for BERT I Chamber Testing	Dr. Bernard McIntyre
92	Fourier Analysis of the Pattern Electroretinogram	Dr. Leathem Mehaffey
93	Profiling Air Force Family Work Groups to Optimize Service Satisfaction and Career Commitment Impact	Dr. Ivor Mitchell
94	No Report Submitted	Dr. Osoma Mostafa
95	Chlamydomonas Photoaxis as a Simple System for Vision Research	Dr. Rex Moyer
96	Normobaric Oxygen Concentration Effects on Cultured Mouse Macrophage Responses	Dr. James Mrotek
97	Isothermal Differential Scanning Calorimetric Studies of Thermal Decomposition of 1,4-Butanediammontium Dinitrate	Dr. Maurice C. Neveu
98	A Study of the Relationship Between Leadership and Job Satisfaction/Career Commitment Among Air Force Personnel	Dr. Robert E. Niebuhr
99	A Review of Research Literature on the Measurement of Forces/Pressure on the Plantar Surface of the Foot During Gait Using Ambulatory Transducers	Dr. Marion L. Noble
100	A Silicon Vidicon System for Profiling 1.06 μm Laser Pulses	Dr. Robert O'Connell
101	Free Radical Spectra of PO	Dr. Ralph Oberly
102	ATR Performance vs Image Measurements	Dr. Won J. Park
Volume III		
103	Blast Propagation Through a Composite Wall Section	Dr. Desmond Penny
104	Novel Means of Formaldehyde Analysis Adapted to USAF Laboratory Needs	Dr. Thomas Pierce
105	Raman Spectroscopy of Glycosaminoglycans from Cornea	Dr. Boake Plessy
106	Prediction of Surface Roughness Effects on Heat Transfer and Skin Friction	Dr. Arnold Polak

107	The Influence of Condensed Water Revaporization on Wind Tunnel Test Results	Dr. Justin H. Poland
108	Study of System Impairment Detection and Classification Algorithm for Unmanned Research Vehicle	Dr. Kuldip S. Rattan
109	Nonlinear Analysis of Composite Supports for Armor	Dr. Hemen Ray
110	Diagnostics of Solid Propellant Combustion	Dr. John P. Renie
111	Construction of Approximate Formulae for the Calculation of Conductivity Coefficients in Partially Ionized Gases	Dr. Michael B. Rhodes
112	A Literature Survey on the Formation and LUminescence of $NO(A^2\Sigma)$ in a Hydrazine N_2O_4 Propellant System	Dr. Robert W. Ricci
113	Numerical Modeling and Inversion of 63 μm Earthlimb Emission From Atomic Oxygen	Dr. James P. Riehl
114	No Report Submitted	Dr. Michael Ross
115	Nondestructive Evaluation of Advanced Composites by Strain Field Analysis Acquired Through Correlation of X-Radiographs	Dr. Samuel S. Russell
116	Infrared Radiation Target Modeling System	Dr. Sally Sage
117	Modeling of Tire/Soil Interaction	Dr. Joseph E. Saliba
118	Bacteriologic Techniques for the Isolation of Legionellae From Aquatic Environments	Dr. Gordon D. Schrank
119	Chemical Laser Research on the Iodine Monoflouride (IF) System	Dr. Ronald Sega
120	Modeling the Tissue Solubilities of Halogenated Methanes, Ethanes, and Ethylenes	Dr. Paul G. Seybold
121	Digital Simulation of Surface-to-Air Missiles and Smoothing of Cinetheodolite and Radar Data	Dr. Shawky E. Shamma

122	Indoor Radon Pollution	Dr. Ralph W. Sheets
123	Reliability of Systems with Markov Transfer of Control	Dr. Kyle Siegrist
124	The Synthesis of Reactive Intermediates	Dr. Ricardo Silva
125	Possible Targets for Testing the Neutral Particle Beam at Low Energies in the Mark I Aerospace Chamber	Dr. S. Ballou Skinner
126	Preparation of Non-Flammable Model Compounds	Dr. Terrill D. Smith
127	Studies on Combustion of Liquid Fuel Sprays in Stagnation Flows	Dr. Siavash H. Sohrab
128	Monitoring Environmental Quality by Metabolite Analysis	Dr. Richard G. Stebbins
129	Analysis of Geometric Attenuation in Ground Motion Testing	Dr. Bob W. Stewart
130	Competition Guide for Base-Level Buyers 1985	Dr. Lowell E. Stockstill
131	The Role of Antioxidants in Hyperbaric Oxygen Toxicity to the Retina	Dr. William L. Stone
132	Assessment of Maximum Entropy Method Software for Treatment of Data From the AFGL Labcede Facility	Dr. James E. Sturm
133	Inference Propagation in Emitter, System Hierarchies	Dr. Thomas A. Sudkamp
134	Particle Scattering in Plumes	Dr. William Holt Sutton
135	Thermal Stability of Aluminum-Iron-Cerium Alloys	Dr. Robert Swanson
136	The F-15 SPO Support Equipment "Tiger Team"	Dr. Patrick J. Sweeney
137	Studies in Holographic Procedures	Dr. Charles E. Taylor
138	Dynamic Stress Analysis of Layered Structures	Dr. Joseph W. Tedesco
139	An EPR Study of the Decomposition of Various Dinitrotoluenes and the Synthesis of Azo Compounds	Dr. Walter E. Trafton

140	A Comparison of Measured and Calculated Attenuation of 28 GHZ Beacon Signals in Three California Storms	Dr. Larry Vardiman
141	Allocation and Assessemnt of Logistics Resources	Dr. Daniel T. Voss
142	Natural Language Understanding Using Residential Grammar and Its Use in Automatic Programming	Dr. Christian C. Wagner
143	Stability and Control Computer Program for Conceptual Aircraft Design	Dr. Richard C. Walker
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146	Development of High Strength Titanium Alloys VIA Rapid Solidification Processing	Dr. Isaac Weiss
147	"POPCORN" As a Tool for Future Cognitive Workload Assessment: A Conceptual Analysis	Dr. Shih-sun Wen
148	Labeling the Topographic Features of a Gray-Level Image	Dr. David C. Wilson
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APPENDIX III B

ABSTRACTS

INDIVIDUAL DIFFERENCES IN ABILITIES, LEARNING, AND COGNITIVE PROCESSES

by

Phillip L. Ackerman

ABSTRACT

This paper represents the final report of my participation in the 1985 Summer Faculty Research Program in the Test and Training Branch of the Air Force Human Resources Laboratory (AFHRL) located at Brooks AFB. This research program has a combined focus of a) the determination of the basic causes and manifestations of individual differences in learning during skill acquisition and knowledge acquisition task practice; and b) refinement of a theoretical/empirical approach to interrelating cognitive abilities with individual differences in learning -- that provides a foundation for improved predictors of present and future performance in learning and training environments. The approach to these issues involves an integration of information processing theories of learning, practice, and skill acquisition with intellectual/cognitive ability constructs. During this summer research period several experiments have been completed that converge on the derivation of information about individual differences in learning and the relations between cognitive/intellectual abilities and learning.

MAXIMUM VOLUNTARY HAND GRIP TORQUE FOR CIRCULAR ELECTRICAL CONNECTORS

Dr. S. Keith Adams
and
Philip J. Peterson

ABSTRACT

A study employing twenty male and eleven female subjects was performed to determine maximum hand grip torque that can be exerted when tightening or loosening circular electrical connectors. A static, sustained three-second exertion was used as the strength criterion. Torque was applied to simulated connector rings with diameters of 0.9, 1.5, and 2.0 inches and was measured by means of a single bridge torsional load cell. Other variables tested included the type of grip employed (full or fingertip), orientation of the connector (front, right side, or rear facing behind a barrier), the use of work gloves and chemical defense gloves, the height of the connectors (60% and 85% of the maximum reach height) and the direction of rotation. Hand grip torque strength was found to be directly related to connector diameters with similar strength patterns exhibited for tightening and loosening. Higher torque was exerted when the connectors were on the subject's right side, and tightening and loosening effort corresponded to flexing and extending the wrist parallel to the forearms. The use of gloves resulted in higher torque in most situations. Connector height and direction of rotation had little effect on torque strength.

PROPERTIES AND PROCESSING OF A PERFLUORINATED POLYALKYLENE LINKED POLYIMIDE

by

Vernon R. Allen

ABSTRACT

The chemical and physical properties of a thermoplastic aromatic polyimide were examined with regard to cure conditions by IR and DSC techniques. Reaction by-product evolution and thermal stability were also examined by TGA and by GC-MS. In the absence of activating catalysts such as pyridine or dimethylacetamide and moisture scavengers such as acetic anhydride, the reaction of the monomers proceeds slowly in the 100°C - 200°C range. Final imidization with H_2O release occurs very slowly above 150°C due to the concomitant increase in the glass transition temperature. Complete reaction required extended cure periods above the glass transition temperature of 350°-370°C. In the absence of (the plasticizing agent) N-methylpyrrolidone, compression molding with sample compaction (flow) of a partially cured molding powder required molding pressures in excess of 200 psi at 380°-400°C. The 130°-140°C "consolidation window" was not found for this sample of polyimide.

Quantifying Experience in the Cost of Human Capital

by

Jihad A. Alsadek

ABSTRACT

The literature search led to the identification of a Historical Cost Model, a Replacement Cost Model, and a Present Discounted Value Model as tools to put a price (cost) on human experience. The Present Discounted Value, or Discounted Cash Flow Model, lends more credibility and accuracy to pricing human experience than the other two models. The civilian sector uses three approaches (the Economic Approach, the Accounting Approach, and the Alternative Investment Approach) and three techniques (the Key Man Insurance Technique, the Causal-Intervening Variable Technique, and the Investment Quantification Technique) to cost human experience. The military costing practices are nothing more than different versions of the Accounting Approach to personnel costing in the civilian sector. Singling out a model or an approach that is capable of quantifying the work experience in the cost of human capital and testing it with some AFSC data is the next step in research for this project.

THE EFFECTS OF RAPHE STIMULATION AND IONTOPHORESIS OF SEROTONERGIC AGENTS ON GRANULE CELL ACTIVITY IN RAT LATERAL CEREBELLAR CORTEX.

by

Deborah L. Armstrong, Ph.D
Christopher McNair
Scott Biscoff

ABSTRACT

Stimulation of the dorsal raphe resulted in modulation of granule cell spontaneous activity. This provides support for the proposal that serotonin functions as a transmitter in the granular layer of the cerebellar cortex, however, the diversity of the observed responses does not permit a precise determination of the nature of the activated synapses. Of the eleven cells that responded consistently, six displayed decreased spontaneous activity, three were excited by the stimulation, and four cells displayed a biphasic response of initial excitation followed by inhibition. The iontophoretic application of serotonin decreased the spontaneous activity of the majority of cells tested and this effect could not be blocked by methysergide. Several cells were excited by serotonin application and this effect could be blocked by methysergide.

TEMPERATURE DEPENDENCE OF ION-MOLECULE ASSOCIATION REACTIONS: HALIDE ION ADDITION REACTIONS

by

Lucia M. Babcock

ABSTRACT

We have found increasing evidence that halide ion addition to the boron trihaldies proceeds via both radiative and collisional stabilization pathways. This is, to our knowledge, the first observation of such a phenomenon. In our studies this summer at Air Force Geophysics Laboratory, we have continued our examination of these interesting association reactions by looking at the temperature dependence of the additions over the range 200K to 400K using a temperature variable Selected Ion Flow Tube. Our studies provide further evidence for both the radiative and collisional stabilization mechanisms, and also reveal the dependence upon temperature of several ion-molecule association reactions. The temperature dependence found agrees well with a simple model of ion-molecule association, and we are in the process of analyzing the data further. In addition, we have examined a series of halide ion addition reactions using several different neutral molecules in an attempt to identify other systems which might exhibit radiative stabilization channels, and to characterize the properties which lead to such behavior. Finally, we have studied the temperature dependence of some bimolecular reactions of the boron trihalides in order to establish some of their chemical properties and energetics.

ACTIVE CONTROL OF FLEXIBLE STRUCTURES

by

Francesco L. Bacchialoni

ABSTRACT

Contol of flexible structures requires as a prerequisite modelling of the structures, and this problem is considered first. Mechanically flexible systems require in theory an infinite number of elasic modes to describe their behavior, but in practice they are usually modelled by large finite-dimensional systems. In this report, a cantilever beam has been modelled using a state variable technique. Two analytical models have been set-up from the equations of the same cantilever beam, one using 4 points (and 8 states), the other using 8 points (16 states). In both cases initial conditions corresponding to the beam lowest mode have been applied, in order to have a predictable state trajectory. Unfortunately, the results are different from what expected and deemed not satisfactory. Limited time of the project prevented a thorough debugging of the situation.

GAS EXCHANGE IN THE RABBIT USING HIGH FREQUENCY VENTILATION IN HIGH ALTITUDE

by

Mukul R. Banerjee
and Yolman Salinas

ABSTRACT

The efficiency of a high frequency flow interruption technique in maintaining an adequate gas exchange in the rabbit was tested, first at ground level and then in a hypobaric chamber at 8,000 feet simulated altitude. This was immediately followed by retesting under ground level conditions. Four adult New Zealand White male rabbits were used. The anesthesized and intubated rabbits, injected with a muscle relaxant, were ventilated at 1,5, and 7 Hz with a minute ventilation of 1,2,3 liters per minute respectively. Data were collected for approximately one hour at each frequency. The parameters recorded were : systemic arterial pH, pCO2, HCO3, PO2, blood pressure, heart rate, proximal air way pressure, inspired and expired flow rates, inspired and expired volume, con centration of O2 and CO2 in mixed expired air. The high-frequency ventilation technique utilized did not adversely affect the arterial PCO2 of rabbits at high altitude. Also, the arterial-alveolar PO2 ratio showed an improvement at high altitude with high-frequency ventilation. We conclude that high-frequency ventilation maintained an adequate pulmonary gas exchange in rabbits at high altitude.

COMPUTER AUTOMATED, TEST MIRROR REGISTRATION SYSTEM FOR THE RING LASER GYRO

by

Rex Berney

and

John Taranto

ABSTRACT

The goal of the project was to develop an automatic optical element positioner for the ring laser gyro experiment. Various schemes for using a CCD line scan camera for precision positioning of optical elements were investigated. It was found that one micron precision repositioning of an optical element could be achieved using scattered laser light and appropriate optics. An interface for the CCD line scan camera to the LSI-11/23 computer was designed and built, and the controlling software, both FORTRAN and MACRO code, was written.

^{27}Al Spin Lattice Relaxation Measurements in Alkylammonium-Chloroaluminate Room-temperature Electrolytes

by

Richard D. Bertrand

ABSTRACT

Spin lattice relaxation times (T_1) were measured at several temperatures for alkylammonium-chloraluminate room-temperature melts. Most of the measurements were made for the 1-methyl-3-ethylimidazolium-/aluminum chloride system with a 0.60 apparent mole fraction of $AlCl_3$. The observation of a relatively slow relaxation for ^{27}Al in $AlCl_4^-$ and fast relaxation for a melt containing a 1:1 mixture of $AlCl_4^-$ and $Al_2Cl_7^-$ are consistent with rapid exchange of ^{27}Al in $AlCl_4^-$ with $Al_2Cl_7^-$. The results indicate an exchange lifetime for $AlCl_4^-$ less then or equal to the relatation time for ^{27}Al in $Al_2Cl_7^-$ of about 200 μs.

ABSTRACT

NATURAL LANGUAGE UNDERSTANDING USING RESIDENTIAL GRAMMAR AND ITS USE IN AUTOMATIC PROGRAMMING

by

Dr. Peter J. Binkert
Dr. Christian C. Wagner

Mr. Thomas L. Schnese
Ms. Frances M. Vallely
Ms. Kathleen A. Malin

The research outlined here focuses on the development of a methodology for the creation of a natural language interface. It includes a set of software tools and procedures based on a non-transformational theory of language called Residential Grammar (RG; Binkert, 1983, 1984, 1985). The development of the natural language tools began with two parallel efforts. The computer science team worked on the implementation of the LISP version of the RG syntactic parser of English, while the linguistic team concentrated on the development of a first set of semantic features out of which the case relations of language could be defined. Once completed, the natural language understanding tool could be integrated into a computer's operating system to act as an interface between a computer system and a computer user. This would reduce the confusion caused by the various command languages on different computer systems.

SPEECH EFFECTS OF HIGH SUSTAINED ACCELERATION: A PRELIMINARY STUDY

by

Z.S. Bond

ABSTRACT

The acoustic-phonetic structure of speech produced under adverse circumstances such as high noise levels, vibration, and stress, has received little investigation. The purpose of this study was to provide some preliminary data concerning speech produced under high sustained acceleration. Acoustical measurements were made of a set of words as spoken by two subjects at 1G and 6Gz. Words produced under acceleration were different from words produced at 1G in both durational and spectral characteristics.

AUTOMATIC DETERMINATION OF OBJECT ORIENTATION IN 2-D IMAGES

by

Kevin W. Bowyer

ABSTRACT

This report deals with the problem of determining the orientation of 3-D objects from their appearance in images. The proposed method for solving this problem combines techniques of image enhancement, edge detection, hidden surface projection, and optimization. The immediate application of the method is in demonstrating the feasibility of a more automated Graphic Attitude Determining System (GADS). However, the techniques involved should also have important applications in computer vision and robotics.

SIMULATION OF JET INJECTION USING 'RAVEN'

Eugene F. Brown

ABSTRACT

The transverse injection of a sonic jet into a transonic free-stream flow was calculated using a three-dimensional Navier-Stokes computer program called RAVEN. Satisfactory results were obtained including the prediction of the bow shock, the separation shock, and the expected amount of penetration. Additional work is proposed including the addition of turbulence modelling and the calculation of a supersonic, reattaching, back-step flow.

THE IMPACT OF COGNITIVE STYLES AND SUBJECT MATTER ON INSTRUCTIONAL DESIGN

by

Linda J. Buehner, Ed.D.

ABSTRACT

Basic research in neuropsychology, learning theory, memory, and cognitive psychology have contributed to knowledge concerning human learning. This research has been applied to the identification of cognitive styles, defined as an individual's unique method of processing information. Research into ways to apply this knowledge through computer-based instruction, the increased use of microcomputers, and the introduction of artificial intelligence techniques into training has permitted more effective use of computer-based instruction in training applications. Instructional designers, however, are not currently provided with adequate techniques for the development of individualized instruction. Research also acknowledges the importance of taking into account the nature of the training subject matter content. Guidelines concerning information presentation in computer-based instruction should be provided for instructional designers to allow for the individual cognitive style of the trainee and for differences in subject matter content. This paper reviews current research in neuropsychology, cognitive style, and instructional design. It will provide a framework for further research in the most effective mode of information presentation, considering the interaction of cognitive style and training subject matter.

POLYNOMIAL FEEDBACK CONTROL FOR ROBOTIC MANIPULATORS

by

Dr. Connie K. Carrington

ABSTRACT

New nonlinear feedback control laws using redundant kinematic parameters are developed for nonlinear dynamical systems. The use of Euler parameters instead of angles replaces the transcendental nonlinearities with polynomials in the equations of motion, permitting the systematic development of polynomial feedback control laws. This control method is successfully applied to spacecraft attitude maneuvers using conjugate angular momenta as feedback variables, and gains that are power series in time are found in closed-form. To apply this method to robotic manipulators, a new derivation from optimal control theory is found for the costate equations, in which the position-dependent inertia matrix does not need to be inverted. Polynomial control laws with time-dependent gains can then be determined in closed-form. The method is applied to the equations of motion for a two-link manipulator.

MODIFICATION AND EVALUATION OF HEAT TRANSFER CALCULATIONS USING THE AFWL PNS CODE

by

R. R. Chamberlain

ABSTRACT

This report describes the computational study which was performed using the AFWAL PNS code. The main features of interest are the calculations of heat transfer rates and skin friction coefficients. It is found that there are cases for which the PNS code does not predict results which are consistent with classical analytical analyses. This study indicates that the lack of correlation is associated with such a rapid and apparently nonphysical boundary layer growth that classical analysis is no longer valid. Recommendations for further study on the question of the boundary layer thickness and its relationship to the calculation of flow field gradients are put forth and discussed.

OPTICAL AND X-RAY TOPOGRAPHIC CHARACTERIZATION OF UNDOPED SEMI-INSULATING GaAs

by

Jharna Chaudhuri
Assistant Professor

ABSTRACT

Distribution of EL2 concentration, variation in local strain and composition, as well as dislocation pattern in undoped semi-insulating GaAs were characterized by using different techniques. The GaAs single crystals were grown by liquid encapsulated Czochralski method. The concentration of deep donor EL2 was measured by optical absorption method. A comparison of EL2 concentration in crystals grown under low pressure and high pressure was made, which showed that the crystals grown under low pressure have less EL2 concentration.

X-ray rocking curve analysis was performed to measure dislocation densities as well as non-uniform strains arising from local lattice distortions. An attempt was also made to determine the local variation in composition in the wafer. This x-ray rocking curve analysis study is at a preliminary stage at present and needs further detailed investigation.

Visualization of Jet Flames

by

Lea D. Chen

ABSTRACT

Two different techniques of flow visualization were used to study structures of hydrocarbon jet diffusion flames. It was concluded that a chemically reactive scheme[1], which forms $TiO_{2(s)}$ in flows, provides the best visualization of fluid motion of jet diffusion flames, and caution should be exercised in interpreting images of axisymmetric jet flames using refractive index methods such as schlieren and shadowgraph visualization. In the near burner region, four distinct flow structures can be identified: flame zone, large outer vortices, smaller inner vortices, and potential core. It was found that Reynolds number is not sufficient in characterizing vortex structures of jet flames, instead, local strain rates seem to be more proper to use. It is recommended that continual efforts are needed to perfect the 2-D visualization method for high temperature environments and quantitative measurements. It is also recommended that other means for 2-D temperature measurements and 3-D flow visualization deserve research efforts.

SPLINES AND THE FOURIER TRANSFORM

by

David B. Choate

ABSTRACT

Given a sampled-data system we develop a technique using cubic splines to estimate the main lobe of its Fourier Transform. A formula for an arbitrary entry of a Hadamard matrix of any dimension is also given.

PROTECTION FROM NONNUCLEAR WEAPONS : A PROBABILISTIC APPROACH

by

Karen C. Chou

ABSTRACT

It is well known that uncertainty exists in all aspects of structural design. The randomness can have significant effect on the reliability of design. The design specification for structures protected from nonnuclear weapons is studied here using a probabilistic approach. A stochastic process called Markov chain is suggested for modelling the detonation locations relative to a target during a sequence of attacks. The model will enable an engineer to evaluate the probability that the target being completely destroyed, severely damaged, lightly damaged, etc. This information will allow one to specify a more realistic design load factor to achieve the desired reliability level for the structure.

FLUID RECIRCULATION, DEPLOYMENT AND RETRACTION OF THE EXPANDABLE RADIATOR

by

Louis C. Chow

ABSTRACT

The focus of the present work is on the fluid recirculation, deployment and retraction of an expandable, megawatt pulse power radiator. Three methods of rolling up the radiator are explored. The bag can be collapsed flat and rolled up like a drum. The bag can be folded up like a paper lantern in 3 ways. The bag can also be rolled up internally or externally lengthwise on its circumference like a sock. Four mechanisms for condensate return are described. The condensate can be moved to the base of the radiator by a wiper. It can be pumped out of the radiator through liquid return channels. A rotating bag can provide the required body force for liquid return. The liquid can also be moved to the base of the radiator by simply requiring the bag to roll in completely. Other miscellaneous items such as flow unsteadiness are also considered. Finally, for follow-on research, two tasks are recommended.

Applications of Internal Reflection Spectroscopy to the Characterization of Thermoset Polymers

by

Derald Chriss

ABSTRACT

Internal reflection spectroscopy has been explored as an additional means of characterizing thermoset polymers. The results indicate that internal reflection spectroscopy (also known as attenuated total reflection (ATR)), is an important means of analysis. ATR is especially critical when the thermoset polymers are highly absorbing thin films, or when they are obtained in rigid and bulky forms (cases where ordinary transmission spectra are not useful).

Specimens obtained and analyzed were an acetylene terminated sulfone (ATS), a meta-acetylene terminated bisphenol A (MATB), polybisthiazole (PBT), and a thermoset polyimide LARC-TPI). Samples were in the form of thin films, powders, fibers and rigid bars. Spectra obtained via ATR, show close resemblance to transmission spectra, which allows for a comparative study. Finally, the results indicate that ATR enables one to incorporate IR as an additional characterizing method.

APPLICATIONS OF FIBER OPTICS AT LOW TEMPERATURE

by

David Y. Chung

Abstract

With the advancement of fiber optic technology, many interesting applications are possible at low temperatures. A systematic testing of different fibers for use at helium temperature (4.2°K) were performed. The advantages of using fiber are many fold compared with the conventional optics. It allows experiments to be performed without an optical dewar. Small sample holders can be made to fit into a conventional helium container and also in the case of using the superconducting magnet for high field magnetooptical work.

What we have demonstrated in this report is that the usefulness of the fibers at low temperatures and its potential for wide applications are not much different from room temperature counterpart. Except there are unusual advantages of using fibers which will be discussed in detail in the report.

EVALUATION OF SELECTED PARAMETERS WHICH AFFECT K_d WHEN MEASURED USING HPLC INSTRUMENTATION

by

Gale J. Clark

ABSTRACT

The sorption coefficient for naphthalene onto a sample of soil was measured using the column technique for the purpose of evaluating potential effects that the experimental methodology and instrumentation might have on the value obtained. The data was examined for possible effects due to changes in flow velocity, influent concentration, and method of development. The reproducibility of the data from different columns packed with the same soil was also studied. It was found that the apparently common practice of simply switching the pump inlet from one reservior to another in order to change the solution being passed through the column ultimately gave a sorption coefficient which was actually a composite reflecting sorption within the pumping system as well as on the soil. Evaluation of other effects were hindered by this phenomena. The major recommendation derived from this study was to redesign the experimental system so as to eliminate the sorption due to the system and then reevaluate the other parameters.

DIPOLE MOMENT OF InP IN THE MELT

by

David R. Cochran

ABSTRACT

The properties of devices are strongly dependent on the quality of the material in which they are fabricated. The properties of these materials, in turn, are directly related to their nature in the molten state and the conditions on the melt from which they are pulled. The basis of this project was the examination of one of the properties of liquid InP, namely, its dipole moment. The determination of this property is expected to yield information for modeling the growth of InP. The experimental design involved the measurement of the static dielectric constant using a form of the heterodyne beat method. The analysis model was the Debye model for polarization of a molecule, having a permanent dipole moment, in a dilute solution of the molecule in a non-polar solvent.

LASER RAMAN LABORATORY RESEARCH

By

Alvin D. Compaan

USAF-UES Summer Faculty Fellow

ABSTRACT

The activities described in this report cover four principal areas: 1) assisting and advising in the setting up of a laser Raman laboratory which had just been moved from another building, 2) pulsed laser annealing of ion-implanted GaAs with an excimer laser, 3) Raman studies on these heavily doped samples, and 4) evaluating possible directions for upgrading the Raman lab. The setting up of the Raman lab involved precision optical alignment of a spectrometer and several lasers and repair of several instruments which were found to be functioning well below specifications. After successful instrumentation intregation in the new lab, Raman data were acquired on a wide range of samples prepared by molecular beam epitaxy, conventional growth, or ion implantation followed by thermal or pulsed excimer-laser anneal. This laser anneal was performed in the author's lab at Kansas State University. Options for upgrading of the Raman laboratory in AFWAL/AADR with multichannel detection capability are also briefly discussed.

AERONAUTICAL DECISION-MAKING

FOR AIR FORCE PILOTS

by

Thomas J. Connolly, Ed.D

ABSTRACT

One of the most critical aspects of flying is manifested in the capability of the pilot to make decisions which reflect his overall understanding of the flight situation. At the present time, training in the cognitive processes required for good aeronautical decision-making is haphazard at best. This study represents an effort to investigate techniques and methodologies for teaching effective decision-making strategies to pilots. Since at least a part of human judgement is based upon bias factors (costs and payoffs) or tendencies to use information not related to safety in choosing courses of action, the implication can be inferred, that if properly developed, this factor of motivation would tend to halt the use of information not directly related to safety and to direct the pilot's decision towared the use of rational processes. A concept model, based on this aspect of judgment, was developed as a part of the study which offers a methodology by which a systematic training program can be conceptualized, designed, and implemented. In addition, a prototype training manual, which includes a student handout on "Pilot Decisional Attribute Questionnaire" (PDAQ) for "Aeronautical Decision-Making" has been developed and optimized.

FEASIBILITY STUDY ON THE LOGISTICS OPERATIONAL ASSESSMENT MODEL

By

Robert H. Corley, Jr.

ABSTRACT

The purpose of this project was to determine if it is feasible to integrate logistics models with combat operational models. This project also determines the requirements for the integration of logistics model modules into a combat operational model. This report describes the benefit of developing this new model and states some of the problems expected in integrating these models. This report also gives a list of models that can be used for this integration.

Photo-Hall Study of Doped and Undoped Semi-Insulating GaAs

by

Billy C. Covington

Abstract

We present the results of a photo-Hall study of semi-insulating undoped gallium arsenide and antimony doped gallium arsenide. The carrier concentration, resistivity, and mobility values are presented as a function of sample temperature and wavelength of light illuminating the sample. The resistance as a function of the length of time of illumination at a particular wavelength and temperature is also presented. The photo quenching of the photoconductivity by inducing the metastable state of the deep donor defect EL2 is reported as well as the effect of annealing on the recovery of the photoconductivity. Conclusions are made as to the effect the wavelength of the illuminating light has on sample resistivity and recommendations are made for additional research.

SPIN FORMED MIRRORS

by

Dennis Cravens

ABSTRACT

The equipotential surface of a rotating fluid in a gravitational field assumes a parabolic contour. By catalytic polymerization of a fluid styrene and polyester resin mixture it is possible to generate a solid paraboloid. The focal length to diameter ratios accessable by this method can be much less than one and are primarily limited by only rotational velocities. A 1.05 m 1.2 f/d on-axis paraboloid and a 3.0 m 0.8 f/d on-axis paraboloid were prepared. Experimental methods for the on-axis paraboloids and a 3.0 m f/d #0.18 collector are described. Applications of the method for mold production of solar concentrators by thermosetting aluminized mylar are discussed.

HIGH-TEMPERATURE ACROSS-PLY TESTING OF C/C COMPOSITES

by

Parviz Dadras

ABSTRACT

Across-ply tensile testing of c/c composites at elevated temperatures is considered. Alternative methods for testing at temperatures up to 4000°F are suggested. These methods are based on graphite-graphite and graphite metal joining procedures, as well as other relevant processes for graphite coating. In particular, liquid-solid phase joining (brazing), and joining from suspensions are proposed.

Two alternative designs for mechanical gripping are also suggested.

STATISTICAL DESCRIPTIONS OF SHAPE IN $\mathbb{R}^2$ AND $\mathbb{R}^3$

by

Charles E. Davis

ABSTRACT

Criteria for statistically useful characterizations of shape are identified, with particular reference to the use of biostereometric data. The Fourier Descriptors of Zahn and Roskies seem to be good candidates in $\mathbb{R}^2$, although two modes of sensitivity to digitization are demonstrated which could limit their usefulness as shape characterization statistics for comparative purposes across a population. Procedures for extending the Fourier Descriptor representations to curves and bands in $\mathbb{R}^3$ are presented, and recommendations concerning empirical studies of the usefulness of the procedures with real data sets are given.

AN ASSESSMENT OF THE DEVELOPMENT OF A DNA PROBE FOR MYCOPLASMA HOMINIS AND UREAPLASMA UREALYTICUM

by

Vito G. DelVecchio, Ph.D.

ABSTRACT

A rapid and simple test for the presence of *Mycoplasma* in clinical specimens would be of immense value in the diagnosis of conditions in which these organisms may be the etiological agents. The commercially available Mycoplasma TC Kit was found to be of no use in the testing of clinical specimens. An initial investigation into the development of a DNA probe for *M. hominis* and *U. urealyticum* was undertaken. Cultural conditions, efficient DNA isolation techniques, and exact protocols for agarose gel electrophoresis were established for these organisms. The initial data indicate that additional work is warranted and that a DNA probe can successfully be developed. Preliminary investigations suggest that *M. hominis* and *U. urealyticum* both possess plasmid DNA molecules. If confirmed by further investigation, these studies will demonstrate the first plasmid found in *U. urealyticum*.

EFFECTS OF NUCLEAR RADIATION ON THE OPTICAL CHARACTERISTICS OF LASER COMPONENTS

by

Dr. Hermann J. Donnert

ABSTRACT

In view of requirements stemming from projects under the auspices of the Strategic Defense Initiative, work has been initiated to explore the effects of nuclear radiation on the optical characteristics of laser components. Pre-irradiation tests have been conducted and samples have also been exposed to the fast-neutron environment in the beam stop of the Los Alamos Meson Physics Facility and to energetic electrons in the beam of EG&G's LINAC. Computer codes for analysis of experimental data have been developed, tested, and used to obtain preliminary results. Further experiments of relevance are in various stages of planning.

Energetic Materials via Alkoxyfluorinations of Alkenes with Xenon Difluoride

by

Dr. Melvin Druelinger

ABSTRACT

Xenon difluoride (XeF_2), is a novel and selective fluorinating agent for organics. The selectivity can be altered by the judicious selection of reaction conditions. Alkoxyfluorinations occur when XeF_2 is added to alkenes in the presence of simple alcohols and acid catalysts. Interest in the synthesis of novel fluorinated energetic materials to serve as binders and plasticizers made this reaction a good candidate for further study.

The system investigated used the energetic alcohol 2-fluoro-2, 2-dinitroethanol and alkenes chosen from a mechanistic viewpoint (norbornene and indene). The desired products incorporate fluorine and the energetically useful fluorodinitroethyl group. Studies included variations in temperature, solvent and catalyst type and concentration. Five isomeric alkoxyfluorination products were formed with norbornene. Less than one equivalent of boron trifluoride etherate favored simple difluoride addition products. Data suggest an ionic pathway. Solvent incorporation interferes with the desired reaction in acetonitrile. Indene is readily polymerized under the reaction conditions except in the presence of simple (nonenergetic) alcohols. It did not undergo the desired reaction. Because of the small scale used and the complex mixtures formed, structure indentification was achieved primarily by gas chromatography and mass spectra.

Several recommendations regarding the continuation of this study are made.

METAL ALKOXIDE SYNTHESIS OF HIGH TEMPERATURE MATRICES

by

Charles H. Drummond III

ABSTRACT

A number of investigations involving metal alkoxide derived high temperature matrix compositions were conducted. Metal alkoxide syntheses of hafnium, zirconium, niobium, and yttrium were completed. A study of particle morphology and properties of acid, neutral and base hydrolysized alkoxides was initiated. High temperature compositions in the Nb_2O_5-ZrO_2 system were studied. Crystallization studies of zirconia and cordierite nucleated amorphous cordierite powders were initiated. An investigation of ZrO_2 toughening amorphous silica was also begun.

Computer Modeling of GaAs and AlAs-GaAs Solar Cells

by

Dr. Leroy E. Eimers

ABSTRACT

A computer simulation of the graded-bandgap $Al_xGa_{1-x}As$ solar cell is developed based on a modified finite element numerical method proposed by Gummel and modified by Lamorte. The method consists of dividing the solar cell into finite sections within which those constants which would vary due to the changing composition of the material are considered fixed. The transport equations can then be solved within each section and the solutions matched at the boundary by the appropriate boundary conditions. The model employs relationships for the electrical constants of an AlAs-GaAs alloy given by a number of sources in the literature. The resulting simulation, written in BASIC, runs on IBM-compatible microcomputers.

ANALYZING GAMMA RAY AND NEUTRON EMISSION SPECTRA

by

Hudson B. Eldridge

ABSTRACT

A method is presented for transferring data files from the fixed disk of an ND-6700 to a VAX computer using a Z-100 microcomputer to emulate a terminal for the ND-6700. Software developed for the Z-100 is discussed which permits a degree of analysis, printouts, and/or graphical displays of the spectral data. The analysis functions include rebinning the data, converting channel number to energy, correcting for solid angle and incident flux, and/or unfolding recoil proton spectra to determine the incident neutron spectra. Graphical displays may be either a point plot or a histogram and the user is prompted for legend and coordinate axis labels.

A method is also discussed for determining experimentally the response function for the detectors used in accumulating these spectra. Some preliminary data from these experiments are presented.

GEOPHYSICAL PERTURBING FORCES ON THE FRANK J. SEILER LARGE PASSIVE RESONANT RING LASER GYRO

by

Dr. Harry W. Emrick

ABSTRACT

Commencing with participation in a Laser Gyro Program Review and culminating with a paper presentation to an International Conference on Earth Rotation, the summer research program at FJSRL was both a challenge to explore the diverse capabilities of ring laser technology and an opportunity to renew and update my geodetic and geophysical knowledge as applied to this project and other on-going scientific activities. The USAF Academy site offers unique opportunities to the scientific community heretofore untapped.

QUASIPARTICLES AND THE TRANSITION TO TURBULENCE

Dr. John E. Erdei

ABSTRACT

A suggestion has been made that some of the observed properties of fluid flows can be explained on the basis of particle, or quantum mechanical principles. The possibility of such a description has been considered by searching for a mathematical basis for this suggestion. By using a treatment of the convective instability as a guide, it is believed that an order parameter description is a foundation upon which to build. This paper discusses the relevant features of the formation of Benard convection cells, and how one might extend the ideas to shear flows.

STATISTICAL BIASES IN IRLV MEASUREMENTS OF TURBULENT FLOWS

by

Dah-Nein Fan

ABSTRACT

Biases in individual realization laser velocimeter (IRLV) measurements of turbulent flows have been topics of intense research since the first bias was reported by McLaughlin and Tiederman in 1973. A review of available literature on the subject reveals (i) the existence of 14 different sources of statistical biases in IRLV, (ii) 10 schemes proposed for bias corrections of IRLV raw data, and (iii) the critical need of a comprehensive theory capable of predicting the joint effects of a multitude of bias sources in a realistic experimental IRLV setup. This report advocates a major thrust toward constructing a theoretical yet realistic bias model of an entire IRLV system. Such a theory when completed should not only lay to rest the decade-old confusion and controversy in interpreting IRLV data, but also remove the last remaining major obstacle in the development of IRLV system as an independent tool for flow diagnostics. Taking a first step in this direction, this report describes some of the important components in a general statistical model suitable for analyzing IRLV biases. Results from a few elementary models are also described in some detail.

ANALYTICAL METHODS FOR THE DETERMINATION OF CHOLESTEROL AND CHOLESTEROL ESTERS IN SALIVARY FLUIDS

Mack Felton

Abstract

Gas-liquid chromatography is the analytical method recommended for quantitating cholesterol and cholesterol esters in salivary fluids. This selected method has the sensitivity for studying the effects of diurnal variation and the effects of salivary flow rates on cholesterol concentrations. Development of a non-invasive method for predicting coronary disease in Air Force flying personnel is desirable. The patient population that comes to the Aeromedical Consultation Service at Brooks Air Force Base for evaluation is unique. These air crewmen differ from civilian populations in that they are much younger and are mostly asymptomatic for heart disease. An attempt was made to express concentrations of cholesterol and cholesterol esters on a creatinine and sodium basis. An exhaustive literature search strongly supports the selection of gas-liquid chromatography as the method to continue this investigation, but does not support use of the parameters, creatinine and sodium. Other biochemical parameters will be considered for correlation with cholesterol and cholesterol esters concentrations. Establishment of a relationship between cholesterol and cholesterol esters concentrations in human blood serum and saliva would facilitate the development of the non-invasive method for securing biological fluids from patients. Improved experimental design should play a large role in bringing the goal and purpose of this investigation to fruition.

Personality Correlates in Pilot Performance

by

Edna Fiedler, Ph.D. and Christine Cato

ABSTRACT

This paper reports on literature reviews of both the typical pilot personality profile, as well as the personality correlates of flight training outcome and flight safety. Next, the analyses of two different studies are reported. The first study found that combat ready fighter pilots from eight NATO countries scored similarly on the personality factors of conscientiousness and experimenting (Cattell's 16PF). The second study reports on the effectiveness of the Pilot Personality Inventory (PPI) in predicting Undergraduate Pilot Training (UPT) outcome. Similar to previous findings in this area, it was found that the PPI was not able to reliably predict UPT outcome across different samples of pilots. The next section of this paper presents the general conclusions from both the literature reviews and the results of the above studies. Finally, the most promising future approaches for studying (1) the use of a personality measure to predict pilot performance, and (2) future research possibilities with the Defense Mechanism Test, which is currently being used by several European countries, are discussed.

TRANSFER OF TRAINING BETWEEN ALTERNATIVE MOTION SIMULATORS

by

John M. Flach

ABSTRACT

The objective of this research project was to identify training strategies for increasing positive transfer in a roll-axis tracking task between the dynamic seat of the Advanced Low Cost G-Cuing System (ALCOGS) and the whole-body motion environment of the Roll-Axis Tracking Simulator. A mixed training procedure in which subjects were trained with a variety of cuing algorithms in the dynamic seat was tested and found to result in no more transfer than previous homogeneous training procedures. Recommendations are made that future studies should use a more difficult task to test transfer of training. The single dimension compensatory tracking task employed in this study may not be sensitive enough to provide a fair test of the utility of dynamic seat training.

CONTROL OF ADAPTIVE OPTICAL SYSTEMS

by

John A. Fleming

ABSTRACT

This final report describes several studies related to the use of large space-based adaptive optical systems for strategic surveillance. In particular we study several proposed procedures for control and estimation, including phase retrieval, calculation of point spread functions for synthetic aperture optical systems, and deconvolution for control of active mirrors. We first describe the phase retrieval problem and discuss several algorithms that we programmed, evaluated, and modified for improved performance. Next, we illustrate the Fast Fourier Transform (FFT) algorithm for two dimensional arrays. We derive sampling constraints so that the FFT can be used to provide the approximate point spread function and optical transfer function for arbitrary configurations and apodizations of synthetic apertures. Finally, we examine the use of deconvolution in the context of estimation and control of actuators for correction of wavefront errors in an active mirror experiment. The problem is one of least squares and we discuss the singular value decomposition for the solution of such problems. Recommendations and modifications of simulation software to include actual wavefront and actuator data (so that a closed loop control system is constructed) are outlined.

ELECTROCHEMICAL ANALYSIS OF THE DEGRADATION OF SYNTHETIC LUBRICANTS

by

Dr. Dennis R. Flentge

ABSTRACT

Electrochemical properties of a lubricant provide useful information regarding the quality of the lubricant and, indirectly, regarding the condition of the turbine engine from which the lubricant was taken. The Complete Oil Breakdown Rate Analyzer, COBRA, and Cyclic Voltammetry have been used to examine several laboratory degraded lubricant formulations. Consumption of the additives PANA and DODPA were noted with only small increases in the COBRA values.

INDUCED NUCLEAR RADIATION DOSE IN A SIMULATED STANDARD MAN WITH IMPLICATIONS ON AIRCREW SURVIVABILITY

by

Bessie Ruth Foster

ABSTRACT

An abbreviated report of a comprehensive research initiative is presented. The study involved computer modeling of a standard man both chemically and geometrically, and assessing whole body and organ depth dose in an induced nuclear gamma radiation environment. The phantom consists of hydrogen, carbon, nitrogen, oxygen, and trace elements, in proportions simulating standard man. A wide variety of tissue equivalent phantoms have been employed in depth dose studies conducted by different researchers previously. These models include slab, cylindrical, water bottle, plastic, and the like. The present study involves re-modeling a "more human" phantom using state-of-the-art graphic techniques to represent the asymmetry and compositional variations of the human body.

The Monte Carlo sampling method along with "Combinatorial Geometry" computer codes accessible at the Air Force Weapons Laboratory (AFWL) are employed to simulate the desired phantom and radiation environmental parameters, and to study radiation transport through material media.

A plausible explanation for radiosensitivity of the gastrointestinal tract is presented. Data indicated a biological anomaly in this organ; it exhibited a low mass density accompanied by high atomic density and atomicity.

The report consists of an introduction, objectives, research approach, results, discussion, and recommendations for implementing the results along with suggestions for follow-on research.

ABSTRACT

Determination of Thermal Properties of Melanin
Using Photoacoustic Techniques

by

James M. Gallas

A photoacoustic detection apparatus was constructed to detect and measure both transient and time averaged pressure responses to pulsed radiation. Photoacoustic signals were recorded to analyze photothermal properties of melanin. Specifically, the thermal diffusivity of melanin was determined and compared with a value from the literature determined in a different manner. The dependence of pressure amplitudes upon laser pulse intensity and pulse frequency was also investigated. The thermal properties of melanin investigated here were then related to the general problem of laser induced retinal degradation and the possible role or roles played by melanin. A variety of experiments based upon the present work and which may lead to an elucidation of the retinal damage mechanism are suggested for future work.

Lidar Measurements of the Mesospheric Sodium Layer at the Air Force Geophysics Laboratory

by

Chester S. Gardner

Abstract

The AFGL Rayleigh scatter lidar system was modified to make measurements of the mesospheric sodium layer by adding a tunable dye laser, a laser wavelength monitor and an energy monitor. Sodium lidar measurements were obtained during several nights in July and August. Measurements were also obtained simultaneously at AFGL and at the University of Illinois during a two hour period in the early morning of August 29. These data are being analyzed for tidal and gravity wave effects. Additional simultaneous lidar measurements at AFGL and the University of Illinois have been planned for the Fall and Winter 1985-86.

AFWL HISTORY

by

Doris O. Ginn

Abstract

The AFWL History is an annual project of the chief historian of the Air Force Weapons Laboratory (AFWL). My research pursuit was associated with that effort. The task assignments included a review of the secondary source material surrounding lasers, particle beams, nuclear weapon effects, and advanced weapons. Additionally, there was an open literature search of Air Force documents, New York Times Index, Los Angeles Times Index, and the Washington Post Index. Interviews of key program managers were conducted to gather data on select topics pertaining to the mission of AFWL for the historical narratives.

OPTIMUM DESIGN OF STRUCTURES WITH MULTIPLE CONSTRAINTS

by

Ramana V. Grandhi

Abstract

Automated design of large aerospace structures requires efficient optimization algorithms because of a large number of design variables and design constraints. Most of the difficulties associated with large structural design are solution convergence and computer resources requirements. Practical aerospace structures generally involve limitations on displacements, stresses, frequencies and flutter requirements. In this study, various mathematical programming techniques and optimality criteria methods were used for studying the relative efficiencies of these methods.

The objective of this study is to come up with a reliable and efficient optimization technique for a general complex design problem. Various optimization techniques were applied in designing several trusses and a multi-cell wing structure, and the number of structural analyses required in each technique are presented.

DESCRIPTIVE EXPLORATION OF PATTERNS IN OPTICAL TURBULENCE PROFILES

Alwin C. Green

ABSTRACT

A large data base of optical turbulence profiles already exists. A profile is a set of seven Cn-squared optical turbulence values which correspond to seven altitudes ranging from 2.2 km to 18.5 km. These profiles are derived from stellar scintillations due to the atmospheric optical turbulence. The profile values of any given level contain wide variations with time, and previous statistical treatments have had limited success in describing these variations. This research effort undertakes other mathematical considerations and seeks to characterize patterns of data behavior with respect to time. There is evidence of episodic behavior and several distinct modes are discussed. A primary finding is a consistent oscillation of a fundamental frequency at all altitudes with average period of about eight minutes. Another significant finding is that all altitudes may sometimes individually adopt a relatively quiescent stable mode. There are other more subtle episodic indications. The activity of individual levels of 2.2km, 7.3km, and 18.5km appear to be completely non-synchronised. However, pattern shapes of any given level is not very distinguishable from pattern shape of another level. The typical value Cn-squared turbulence decreases from the order of 10E-16 at 2.2km altitude to the order of 10E-18 at 18.5 km altitude.

MODULAR MODELING OF SOLID-FUEL RAMJET COMBUSTOR FLOW

Mahesh S. Greywall

ABSTRACT

A "modular" model for computing flow through solid-fuel dump ramjet combustors is presented. The model makes use of the modular concept, in which the combustor flow is broken down into three interacting flow components: a recirculating zone at the combustor inlet step, a recirculating zone at the aft-fuel-grain step, and a directed flow region. A code has been partially developed to compute the combustor flow along these lines, and the results of sample calculations, using the partially developed code, are presented.

THERMAL STABILTY CHARACTERISTICS OF SOME ADVANCED SYNTHETIC BASE FLUIDS

by

Vijay K. Gupta, William Sawyer, and Lenae V. Tuggle

Abstract

Thermal stability characteristics of two Advanced Synthetic fluids MLO 82-507(silahydrocarbon and MLO 82-546 (Polyalphaolefin PAO) have been investigated. Three mixtures were prepared from two fluids with following concentrations: 25% MLO 82-507 + 75% MLO 82-546, 50% MLO 82-507 + 50% MLO 82-546 and 75% MLO 82-507 + 25% MLO 82-546. Thermal decomposition studies have been conducted as a function of time and temperature. Decomposition products were analyzed using viscosity measurements GC analysis, GC/MS analysis, and Infrared spectroscopy. It has been found that the fluid MLO 82-507 the mixture silahydrocarbon is more thermally stable than the fluid MLO 82-546. Both fluids do not show any appreciable decomposition below 357.2 C, but above this temperature rate of degradation increases significantly. The PAO MLO 82-546 decomposes almost completely in 48 hours when stressed at 371.1C, whereas the mixture silahydrocarbon takes 72 hours stress period at 371.1C for the same level of degradation. Mixing two fluids does not provide any advantage as far as the thermal stability is concerned.

USE OF TEXTURE MEASURES IN MULTISPECTRAL SCANNER DATA NUMERICAL CLASSIFICATIONS

by

BARRY N. HAACK

ABSTRACT

Land cover information is important for many Air Force activities. One method of obtaining that information is by remote sensing, frequently using digital classification techniques. This study evaluated the use of digital texture measures with seven bands of multispectral scanner data (Thematic Mapper Simulator-TMS) for the identification of forest and nonforest land covers.

The TMS data variance by bands for representative training sites for land covers of interest were examined to select the best band for texture analysis. Variations of nine texture measures were applied to this band and the better texture measures identified. These measures were applied to the other TMS bands.

Combinations of two to seven of the best texture measures and individual spectral band data were compared for the separation of forest and nonforest areas. For combinations of three or more measurement extractors, texture was shown to be useful.

This study demonstrated the utility of texture measures in digital classification of land cover. This is particularly important because texture measures are more capable of signature extension than spectral information. Necessary continuations of this study include the examination of data for other land covers and geographic locations and the use of different spatial resolution data, such as are available from Landsat.

EFFECT OF HIGH FREE-STREAM TURBULENCE FROM A FREE JET ON FLAT PLATE TURBULENT BOUNDARY LAYER FLOW AND HEAT TRANSFER

by

JE-CHIN HAN

ABSTRACT

Experiments were performed to investigate the effect of high free-stream turbulence on the turbulent boundary layer flow and heat transfer. The high turbulence intensity was produced by a free jet with a diameter of 8". A electrically heated thin foil flat plate test section, with 24" wide and 120" long, was placed at the downstream of the free jet. The mean and fluctuating velocity profiles in the boundary layer were measured at three axial locations of the jet centerline, X = 1.12 D, 4.87 D, and 9.84 D, with two jet velocities, U_o = 62 fps and 110 fps. The calculated centerline turbulence intensity at the same three locations was 5%, 12-14%, and 20%, respectively. The heat transfer coefficient distributions on the flat plate were determined. The results showed that the log-law velocity decreased with increasing turbulence intensity levels, whereas the wake flow were lower than that the flat plate results. The boundary layer transitions were affected by high turbulence; the Stanton number and the friction factor in the fully turbulent flow region increased continuously when turbulence intensity changed from 12% to 20%. The Reynolds analogy factor was much greater than unity. More measurements are required in order to conclude the combined effects of turbulence intensity, length scale, and Reynolds number on the turbulent flow heat transfer.

A STUDY OF COPLANAR WAVEGUIDE AND ITS APPLICATION TO PHASED ARRAYS OF INTEGRATED CIRCUIT ANTENNAS

by

Donald F. Hanson

ABSTRACT

This report describes the current uses reported for coplanar waveguide (CPW). An extensive literature review on CPW is given. Particular emphasis on applications in the field of monolithic phased array antennas is made. A new quasi-TEM, quasi-static analytical solution for CPW is obtained and presented. A description of source modeling for coplanar radiating elements fed by CPW is given. Finally, techniques for modeling CPW in monolithic integrated circuit phased arrays are discussed.

Three-Dimensional Grid Generation For High-Performance Aircraft

by

David Hart

Abstract

A scheme is presented for constructing a computational coordinate grid about a realistic high-performance aircraft configuration. Generating schemes and geometric structure are discussed, emphasizing merger capabilities and the role of singularities.

ANALYSIS OF THE REPORT ON FILAN PERFORMANCE METRICS

by

Albert A. Heaney

ABSTRACT

RADC has been involved with the development of a local area network (LAN) suitable for DoD applications for some seven years. Such a system is designed as a means of information exchange and as a means of sharing centralized resources (e.g. memory, printers, etc.). Due to the lack of standardization in the protocol software, commercial systems are frequently not combatible with each other. This situation forces the user to choose data processing systems more for their combatability then for their capability. The DoD has addressed this problem by developing a standard interface (MIL-STD-1779) and architecture (FILAN). The Flexible Intraconnect Local Area Network (FILAN) is a high speed, baseband, polled-access local network designed for military applications. Performance evaluation of the FILAN is the basis of this report. In particular, Martin Marietta was awarded a contract by RADC to perform measurements of FILAN network capability for the purpose of ultimately characterizing total system performance. A final report has been issued on this contract by Martin Marietta and this report is an analysis of that study.

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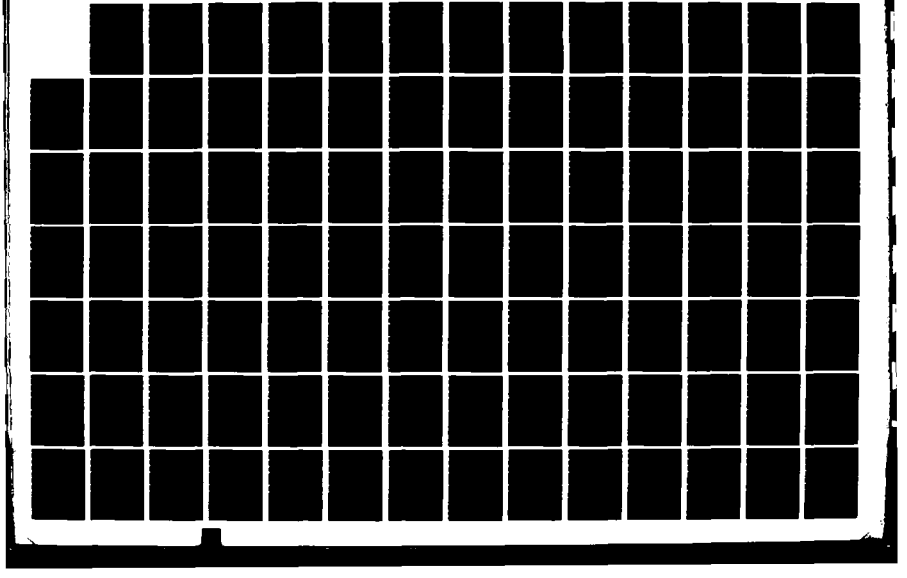

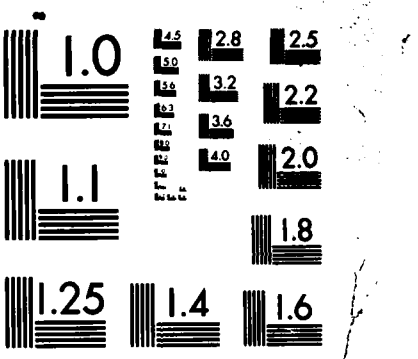

MICROCOPY RESOLUTION TEST CHART
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METHODS FOR RELIABILITY WARRANTY VERIFICATION

by

Carolyn DeLane Heising

ABSTRACT

Methods for reliability warranty verification have been developed and applied to actual USAF systems under design and production. Two principal methods are described. The first is a procedure for predicting USAF system performance in the field (as measured by the variable Mean Time Between Failures (MTBF)), and is based on a Bayesian statistical updating approach. The second is a procedure for tracking maintenance data to verify the variable Mean Time Between Maintenance Actions (MTBMA). In addition, alternative reliability warranties are reviewed, and recommendations made as to which are preferable, particularly with respect to their ease of verification. It was found that the warranties which either guarantee the field MTBF with a verification test, or guarantee the field MTBMA are preferable to other alternatives, including the Reliability Improvement Warranty (RIW). The Bayesian procedure for updating system reliability estimates was found to be very useful in estimating USAF performance, and is recommended for implementation as a method for tracking reliability warranties in practice.

ARTIFICIAL INTELLIGENCE and ROBOTICS PERCEPTION SYSTEM

by

Troy F. Henson

ABSTRACT

A comprehensive artificial intelligence (AI) and robotics research effort has been initiated to develop a perception system for a mobile autonomous robot. A document-level review of the publications in AI and robotics was made and an extensive bibliography of books, periodicals, proceedings, and short courses was classified and compiled for future updating and use as a basis for library and research center purchases both at the Air Force Laboratory location and at Louisiana Tech University. Literature describing research and development of robot perception systems and robot GN&C (guidance, navigation, control) systems was reviewed.

A mobile robot was selected as a vehicle for research and development. An initial AI perception system which includes ultrasonic ranging for robot navigation and mapping was described. The primary problems encountered in the use of ultrasonic ranging have been identified and are described and discussed in terms of possible solutions and alternative approaches. A speech recognition system board for command and control of the selected research robot was designed around NEC's Speech Recognition LSI set and the S-100 standard bus.

Recommendations are made for continuing AI/Robotics Perception System and Robot GN&C research including the development of a robot simulation, an ultrasonic sensor array and signal processing scheme, the construction and testing of the speech recognition board, and the development of a vocabulary for robot command and control.

THE THERMODYNAMIC, PHYSICAL AND OPTICAL PROPERTIES OF ALUMINUM OXIDE

by

Astor Y. Herrell

ABSTRACT

The scientific literature was reviewed in order to determine the thermodynamic, physical and optical properties of Aluminum Oxide. Its was found that the most stable form of the solid is α-Al_2O_3. It standard enthalpy of formation is -397.6 ± 0.3 K cal $mole^{-2}$: its heat of fusion is: 26.55 ± 1.0 K cal $mole^{-1}$, and the melting point, 2324 ± 6K, has been adopted. The data in the literature show that its density at the melting point is 3.01 g/cm^3 and has a temperature dependence given by $\rho = 5.632 - 1.127 \times 10^{-3}T$. A value for the surface tension of molten Al_2O_3 and its temperature dependence is given. The emissivity of molten Al_2O_3 is about 0.9.

GEOID MODELING AND INTERPRETATION

by

Albert T. Hsui

Dept. of Geology, University of Illinois

ABSTRACT

Utilizing SEASAT altimetry data to delineate mantle structure immediately beneath the lithosphere at passive margins has been carried out. A forward modelling approach is followed to study geoid anomalies. Models to simulate thermal mechanical structures within the mantle have been developed. Calculations to translate density anomalies to surface geoid heights have been investigated. It is found that many fundamental problems exist in modelling geoid anomalies for a flat earth. Sensitivity of model parameters have rarely been examined. Although the ten weeks appointment is not long enough to complete the original proposed research, many newly identified problems and the future research direction for surface geoid interpretation will be discussed.

FTIR SPECTROSCOPIC STUDY OF HYDRAZINE INTERACTIONS

WITH CLAY MINERALS

by

Clifford T. Johnston

ABSTRACT

Fourier Transform Infrared (FTIR) spectra of the [montmorillonite:water], [montmorillonite:hydrazine], and [kaolinte:hydrazine] complexes were obtained in a controlled environment (CE) FTIR cell as a function of pressure. A controlled environment FTIR cell fitted with Irtran (ZnS) windows was constructed for controlling the absolute pressure and gas composition of the vapor phase in contact with the clays during the sorption and desorption studies. Desorption studies of the [montmorillonite:hydrazine] and [kaolinite:hydrazine] complexes in the CE cell indicate that hydrazine is irreversibly adsorbed on the surfaces of these clays. Similar studies of the [montmorillonite:water] complex indicate, however, that water is not irreversibly adsorbed. The results from this study suggest that montmorillonite and kaolinte adsorb hydrazine more strongly than water. The inner hydroxyl stretching band of non-reacted kaolinite, which normally occurs at 3620 cm^{-1}, was observed to increase in frequency to 3628 cm^{-1} after contact with hydrazine vapor. The spectral data indicate that the $-NH_2$ moiety penetrates the siloxane-ditrigonal cavity on the interlamellar surface of kaolinite.

Experimental Studies Related to III-V Semiconductor Growth and Characterization

by

Dr. Patrick L. Jones

ABSTRACT

Experiments in three areas relating to the growth and characterization of semiconductor materials were attempted during this summer fellowship period. Efforts in the first area, photo-assisted molecular beam epitaxy, were aimed at overcoming substrate temperature problems in the growth of heterostructure materials. Attempts to perform preliminary experiments in this area were frustrated by equipment delivery delays and problems. Construction of the apparatus and preliminary measurements were conducted in the second area of research, the kinetics and decomposition of metal organics of interest to metal organic chemical vapor deposition. These results showed difficulties in using the original doser design and quadrupole mass spectrometer. Subsequent changes improved the apparatus performance. Generation of tunable radiation in the region between 700-900 nm enabled studies in the last area of interest, photoluminescence excitation spectroscopy of GaAs using sub band gap excitation, to be conducted and yielded preliminary spectra showing an unexpected Raman feature.

Preliminary Study of Learning Nets and Massive Parallelism

by

Jeremy Jones

ABSTRACT

I believe that intractably high control cost of massively parallel systems is the fundamental difficulty of our current technology. Not only does it severly limit our cost effective exploitation of inexpensive VLSI computing units, but in learning research stimies our work to mimic the human brain's massive parallelism with adaptive net learning models. Although I worked in other areas of research and study in this short summer period, this report will be confined to the above research topic because it is so vital for the success of learning systems. Dr. A Harry Klopf (Klopf 1982) has provided the general conceptual framework within which these ideas have been developed. The basic idea comes from recognising the intractability in modeling even a small economy in which every decision affects all other decisions (including the original decision itself!). Given the computational impossiblity of modeling such complexity it is remarkable that self-interest through the pricing mechanism essentially optimizes system-wide resource allocation and other behavior in terms of meeting individual needs. An analogous distributed control Operating System is conceived with tractable coordinating message passing overhead. Just as in the economic case, control is imperfect in the individual case, but optimized in a statistical sense over the system at large. Solutions are proposed for the ubiquitous problems of synchronization, exclusion, deadlock avoidance and determinism.

APPROXIMATE MATHEMATICAL SOLUTIONS FOR UNIDIRECTIONAL COMPOSITES CONTAINING BROKEN FIBERS

by

Walter F. Jones

ABSTRACT

A study of approximate solutions for unidirectional composite laminates containing broken fibers is presented. Assumed displacement fields within finite elements are used to write the element equilibrium equations in terms of displacements. These equations are then solved with appropriate boundary conditions to calculate the stress concentration factors for various numbers of broken fibers. The effect of various types of assumed displacement fields is studied in order to suggest criteria for the selection of optimum displacement functions that will allow the solution of the differential equations, will satisfy appropriate boundary conditions, and will retain proper behavior near the crack for any number of broken fibers.

LONG TERM LIFE EXPECTANCY RADIATION EFFECTS: AN ULTRASTRUCTURAL STUDY OF BRAIN TUMORS DEVELOPED IN MACACA MULATTA FOLLOWING EXPOSURE TO PROTON RADIATION

by

Betty Ruth Jones, PH.D.
Richard Alexander Hunt, Graduate Assistant

ABSTRACT

In 1964 the United States Air Force School of Aerospace Medicine (USAFSAM) and the National Aeronautics and Space Administration (NASA) initiated a series of whole body experiments to determine the effects of space radiation primarily proton radiation on Macaca mulatta (Rhesus Monkey). Out of 453 exposed primates, 21 developed brain tumors concentrated at an energy level of 55 MeV and between 200-1200 rads. No tumors were observed in control animals. The focus of one phase of the current research was to study the ultrastructure of these tumors in addition to specifically assessing tumor type and confirming light microscopy tumor diagnosis. As a result of this study techniques of electron microscopy (EM) and the transmission electron microscope have proven to be useful for the precise cellular classification and identification of specific markers for tumor diagnosis.

Design Considerations for Phase Dependent Voltage Contrast Technique for Application to SEM Analysis

and

Electrical and Optical Characterization of Certain Doped Organic Polymers

by

Prasad K. Kadaba

ABSTRACT

A detailed design of the Phase Dependent Voltage Contrast technique (PDVC) that can be used for test and evaluation of IC devices has been outlined. The technique is easy to implement with the SEM and operates on the principle that the detector current due to secondary electrons emitted from a device under test (DUT) in a SEM can be modulated by a suitable signal applied to the substrate of the device. LSI failure analysis is enhanced by image contrast of signal phases, and during LSI complex pulse sequencing, proper control of PDVC gates allows imaging of particular device states. The PDVC technique also has the capability to measure internal propagation delays, which had formerly been possible only with expensive electron beam blanking

SYNTHESIS OF NOVEL POLYBENZIMIDIDAZOLE MONOMERS

ABSTRACT

James Kane

Synthesis schemes for the preparation of monomers for poly(1,5(7)-dihydrobenzo[1,2-d:4,5-d]diimidazole-2,6-diyl) and poly(1,5-diphenylbenzo[1,2-d:4,5-d]-diimidazole-2,6-diyl) are proposed. Specific monomers discussed are 1,5(7)-dihydrobenzo[1,2-d:4,5-d]-diimidazole-2,6-dicarboxylic acid, 5,6-diaminobenzimidazole-2-carboxylic acid and N^1,N^4-diphenyl-1,2,4,5-tetraaminobenzene.

The preparation of certain key intermediates for each of the monomers are described. Specific compounds discussed are 5-nitro-2-trichloromethylbenzimidazole, 1,2-di(p-toluenesulfonamido)-4,5-diaminobenzene, 1,2-diamino-4,5-dinitrobenzene, 1-amino-3-(trichloroacetamido)-4,5-dinitrobenzene and N,N'-diphenyl-2,5-diaminoterephthalic acid.

A THERMAL EVALUATION OF A PORTABLE, BATTERY-POWERED, VAPOR-COMPRESSION COOLING SYSTEM

by

Amir Karimi

ABSTRACT

The thermal performance of a portable, battery-powered vapor-compression cooling unit, designed by Arthur D. Little, Inc., under contract to The Air Force School of Aerospace Medicine is tested under diverse environmental conditions. The personnel cooler is a portable refrigeration/air conditioning unit to be used with the ground crew liquid-cooled garment.

The cooler consists of a compressor, a condenser, an expansion valve, a fan, a pump to recirculate coolant throughout the vest, and a DC motor to drive the compressor, the fan and the water pump. The cooler is tested in an environmental chamber. The results suggest that the cooler is capable of removing up to 450 W of heat at 25 ^{o}C ambient condition. However, the rate of heat removal drops sharply with the increasing ambient temperature.

An ILC-Dover liquid-conditioned garment (Model 0001684-D1-01) (LCG) is also tested. It is shown that this garment is not optimally compatible with the cooling sytem in that it does not allow for maximum heat removal. Several recommendations are offered to improve the present system. Additionally, it is suggested that further investigations be conducted to improve the cooling system.

MECHANISTIC STUDIES OF ENERGETIC MATERIALS: ANALYSIS OF 2,4,6-TRINITROTOLUENE THERMAL DECOMPOSITION PRODUCTS

by

Daisy White Kimble

ABSTRACT

High Performance Liquid Chromatography (HPLC) was used to study the thermal decomposition products of 2,4,6-Trinitrotoluene, (TNT). Samples of decomposed TNT were chromatographed to obtain identification and reproducibility of retention times for all peaks, (possible decomposition products). Isocratic and gradient elution runs were made for all samples. Retention times for known standards (possible decomposition products), were obtained from HPLC analysis.

Mobile Phase Liquid Chromatography (MPLC) was used for isolation of the decomposition products. Solvents used in this study were based on polarities, and these are hexane, ethyl acetate, chloroform, acetone and methanol. Solvent fractions were used, they are 100% hexane, 95-5% hexane/ethyl acetate, 50-50% hexane/ethyl acetate, 100% ethyl acetate, 100% acetone, 100% chloroform and 100% methanol.

From HPLC analysis, the 95%-5% hexane/ethyl acetate fraction gave the best chromatogram for isolation of the decomposition products.

With fractions from the MPLC and through multiple injections on the HPLC, enough product could be isolated to obtain a Mass Spectrum and Nuclear Magnetic Resonance for identification of these thermal decomposition products.

ROLE OF STIMULUS UNCERTAINTY IN VISUAL CONTRAST SENSITIVITY

by

David L. Kohfeld, Brian Hayes

ABSTRACT

This research involved the study of contrast sensitivity under conditions of stimulus uncertainty and event uncertainty. In Experiment 1, contrast sensitivity functions (CSFs) were generated at six spatial frequencies when the threshold stimulus was either predictable (i.e., cued or blocked) or unpredictable (uncued and intermixed). The resulting CSFs were the same for the three cueing conditions. Experiment 2 revealed a change in the CSF when the sequence included catch trials (event uncertainty) in conjunction with unpredictable spatial frequencies (stimulus uncertainty). The data were then collected into separate distributions for the catch trial and no-catch trial conditions, and deconvolving the former distribution from the latter resulted in a difference model that was gamma in form. The CSFs in both experiments provided support for a version of multichannel theory which assumes that a wide range of spatial frequency channels can be monitored simultaneously. The distributional analyses revealed that contrast sensitivity measures are composed of at least two component processes, sensory detection and response initiation. It appears that stimulus and event uncertainty have selective influence on the response stage, and a theory of the neural mechanisms that underlie the response process is offered. Finally, a practical implication of this work is that undesired "false alarm" (response criterion) bias can be reduced when the method of increasing contrast includes both catch trials and stimulus uncertainty in the sequence.

The Multi-Weapon Multi-Target Multi-Phase Assignment Problem

by

Stephan E. Kolitz

ABSTRACT

In the Strategic Defense Initiative Battle Management and Command, Control, and Communications (SDI BM/C^3), one of the problems that arises is the multi-weapon, multi-target, multi-phase assignment problem. Weapon platforms are satellites in orbit containing kinetic kill vehicles (projectiles) which can be sent to targets (boosters/missiles). A given weapon platform's projectiles have a known probability of hitting any particular target. A ballistic missile's trajectory is typically described as consisting of four phases; three phases are studied here: boost, post-boost, and midcourse. This assignment problem can be formulated as a large-scale non-linear integer programming problem. While no feasible exact solution technique was developed, efficient near-optimal algorithms have been found.

A STUDY OF THE ELECTROCHEMICAL BEHAVIOR OF THE BROMINE/BROMIDE COUPLE IN MELTS COMPOSED OF ALUMINUM CHLORIDE AND 1-METHYL-3-ETHYLIMIDAZOLIUM CHLORIDE

by

Lawrence F. Koons

ABSTRACT

Conventional electrochemical techniques, including cyclic voltammetry and current-voltage scans at a rotating-disk electrode were used to study the title system. Bromine reacts with the melt if aluminum chloride is in excess. The oxidation of the bromide ion is not thermodynamically reversible at Pt, W and glassy carbon electrodes. The tribromide ion is readily formed in melts containing equimolar amounts of aluminum chloride and the alkyl imidazolium chloride. It is both reduced and oxidized at the named electrodes. Mixed trihalide ions appear to be formed in melts containing bromine/bromide and chloride.

THE THERMAL LAYER: A SIMPLIFIED MODEL

by

Arthur A. Kovitz

ABSTRACT

A thermal layer model is described which includes soil properties (void fraction, saturation, density, thermal diffusivity, etc.), blow-off of soil moisture into the atmosphere as a vapor/air exhaust, and time dependent re-radiation into the atmosphere. The radiation heat flux is modeled as "interstitial radiation", dependent on the gradient of the fourth power of the temperature. Use is made of an assumed temperature profile with undetermined functions of time. This is an integral approach which leads to a system of first-order, non-linear differential equations that are solved numerically by Runge-Kutta methods. Results are shown graphically and discussed for a number of parameters: these include surface and vapor/air exhaust temperatures as functions of time; temperature variation with distance in the soil and in the vapor/air exhaust; velocity and massflux of vapor/air exhaust. The model is suitable for coupling with a hydrodynamic calculation such as the HULL code because of its simplicity and qualitative agreement with experiment and other thermal layer calculations.

Analysis of Relationships Among Self, Peer, and Supervisory Ratings of Performance

by

Kurt Kraiger

Abstract

It is expected that performance ratings will continue to constitute a major portion of the Air Force performance measurement program. The relative quality of self, peer, and supervisory ratings in previous studies was assessed using meta-analysis techniques. Meta-analysis refers to a methodology for statistically cumulating the results of empirical studies. Self ratings were found to be slightly more lenient than peer or supervisory ratings, but subject to less halo. Peer and supervisory ratings showed the greatest convergence though peers appear to diverge from other sources in ratings of interpersonal skills. Self ratings diverge the most in evaluations of leadership. It was concluded that peer and supervisory ratings show considerable overlap in measuring total job performance. Self ratings could be included to ensure broader measurement of the total criterion space. All three forms showed sufficient psychometric quality to be used for validation purposes. Suggestions were given for future research on rating source using the Air Force's performance measurement project data.

NUMERICAL STUDY OF DETONATION NEAR A BARRIER

by

Madakasira V. Krishna

ABSTRACT

The Hull (Eulerian) hydrocode developed by Orlando Technology, Inc. has been used to simulate numerically the propagation of detonation between explosives separated by a barrier. The investigation was restricted to two situations. In the first one, a barrier was placed next to the explosive without any medium in between. In the second one, a barrier in between a donor bomb and an acceptor bomb separated by air medium was considered. The main object of this project was to gain familiarity with the complex hydrocode. Suggestions for further research in this area are offered.

SAMPLING PLAN FOR THE ORGANIZATIONAL ASSESSMENT

PAUL S.T. LEE

ABSTRACT

The Organizational Assessment Package (OAP) survey was developed by the Leadership and Management Development Center, (LMDC) U.S. Air Force in the 1970s as means of identifying strengths and weaknesses relative to leadership and management in the Air Force. This report presents a sampling plan as a part of LMDC's effort in searching for a more efficient and scientific survey approach.

The proposed stratified random sampling plan calls for a random selection of about 14,000 individuals on active duty among 12 strata classified by major commands, separate operating units and direct reporting units in the Air Force. The sampling fraction is 1.68 percent for each of the 12 strata as well as for the entire population. Sample sizes among strata range from 600 to 1,987 proportional to sizes of strata. Margins of error range from less than 1 percent to 4 percent. The sampling plan may be inappropriate if changes are to be made in study purposes and statistical assumptions.

ROUTE PLANNING PROBLEM

by

Benjamin Lev

ABSTRACT

This report discusses the Route Planning Problem in which one searches for the shortest route from origination point to destination point. There might be threats along the way and in that case we try at all cost to avoid flying through threats. Each threat has a known coordination, known radius and known probability of kill. If we have to fly through threats then we find the route that minimizes total lethality along that route. The problem is solved using Dynamic Programming. The model is operational on LMI machine using LISP. A simple problem with multiple threats is solved in less than 2 minutes. A copy of the code is available at the Decision Aid Section.

STATISTICAL PERFORMANCE MEASURES:

RELATING AIR FORCE MISSION CAPABILITY TO BASE SUPPLY MEASURES

by

Edward Lewis, Ph.D

ABSTRACT

To optimally manage the base supply system and insure the achievement of maximum flying hours the Air Force seeks to determine a small subset of the supply variables at each base that have the highest impact on MICAP (mission capability) when properly managed and which can be used to predict MICAP. Furthermore, once the salient variables for each base have been identified the Air Force seeks a method to determine significant differences in performance between bases and major commands relative to these supply variables and to grade the overall performance of the base supply accounts.

In this study, the salient high impact variables are identified for major commands and bases.

A technique called VA (Value Assessment) is applied to the supply performance data to determine significant differences between bases and major commands, and to create indices to rank the supply performance of bases and major commands.

Recommendations are set forth for a microcomputer-based base Supply Performance Evaluation and MICAP Management System to be used at each base which will increase supply effectiveness and reduce grounding incidents.

TESTING THE EFFECTIVENESS OF SOME USER FRIENDLY ALGORITHMS

by

Michael Meriwether Lewis

ABSTRACT

The objective of this project was to test the effectiveness of some user friendly human-computer interface algorithms. The vehicle chosen to test these algorithms was the AFLMC Project Management System (PMS). This type of computer system is frequently viewed by the lower echelon project manager as an extra work load that intrudes in the effort to complete the project. As a working measurement of "user friendly", I tested the acceptance of two tools (programs) designed to make the job of "keeping up with the paper work" simple enough to cause the project managers to do so as a matter of course rather than as an assigned task to "get done". These programs have several generalized routines that were designed to be transportable to other programs. Included in these routines are: a "field data editor" that allows any or all characters in a field to be manipulated; a set of "date input/output" routines that allow a date to be entered in many acceptable forms; and routines that treat some data as a word processor problem and other data as a spread- sheet problem.

Interviews with representatives at all echelon levels of the organization were done both before and after the introduction of the project manager tools. The prototype tools were user tested and the initial feed back indicated that the project manager needed such tools and they were anxious to have the tools formally implemented (with a few modifications) as soon as possible into the day to day operations.

The time allocated to the project, 10 man-weeks, was insufficient to design, program, and fully test the effectiveness of the tools. It is recommended that a follow on questionnaire should be used to re-evaluate the findings of the initial tests. In addition, other tools should be designed (and tested) to facilitate the human-computer interfaces at other levels of the Project Management System. This would allow investigation of the interactions within the Project Management System to determine some of the practical techniques that should be designed and implemented.

FAMILY FACTORS AND THE CAREER INTENT OF AIR FORCE ENLISTED PERSONNEL

by

Philip M. Lewis

ABSTRACT

The impact of spouse attitudes and attributes on the career intent and job related attitudes of Air Force enlisted personnel was assessed using the Air Force's new Family Survey (AFFS) to measure spouse attitudes and the Organizational Assessment Package to assess the Air Force member's career intent and job attitudes. The Factor structure or the AFFS confirmed its potential utility for assessing critical family variables. Spouses generally viewed Air Force life as more stressful than civilian life, yet most continued to be supportive of and committed to the Air Force. Prominent scources of stress for these families were disruptions caused by work schedules, TDYs, and military exercises and recalls. Reduced employement opportunities and a reduction in family income attendant upon transfer to a new duty location were also viewed as having a negative impact on the family. It proved possible to predict the career intent and job satisfaction of Air Force members from spouse attitudes and other family variables, most importantly from the compatibility of the marital pair's work schedules, the positiveness of the spouse's view of the Air Force and, for career intent only, the perceived stressfulness of the Air Force member's job and of Air Force life for the family. Implications for Air Force policy are briefly discussed.

AN ANALYSIS OF LOW DISPERSION IRAS SPECTRA OF CARBON STARS, S STARS AND M VARIABLE STARS

by

Dr. Irene R. Little-Marenin

ABSTRACT

My analysis of low dispersion spectra obtained with the IRAS satellite of carbon stars, S stars and M variable stars has shown that 1) about 85% of the carbon stars are surrounded by circumstellar shells as indicated by the presence of the silicon carbide emission feature. The shape of this feature shows little variation from star to star and has a maximum at 11.2 micrometers. The energy emitted in the feature ratioed to the underlying continuum emission is about 20%. 2) Only about one third of the variable M stars are surrounded by circumstellar shells containing silicate dust grains. The shape of the silicate emission feature shows variations from star to star with maximum emission occurring between 9.4 and 10.0 micrometers. The excess emission ratio for M stars is about 30%. 3)About 60% of the known S stars show emission features in the 10 to 11 micrometer region. These features appear to be a composite of emission produced by both silicate and silicon carbide grains.

PRELIMINARY INVESTIGATION ON RESOURCE CONTROL STRATEGIES ON DISTRIBUTED COMPUTER SYSTEMS

REAL TIME vs NON-REAL TIME

by

DAR-Biau Liu

ABSTRACT

Various existing resource control strategies for centralized or decentralized computer systems for real time/non-real time have been studied. Their advantages and disadvantages have been summarized.

The resource management strategies in Arch OS, a decentralized distributed operating system developed at the Carnegie-Mellon University, has been received a great deal of attention in this study. We identify some "new problems" which have to be solved in the design of the decision- making algorithms to determine what "value" the completeness and accuracy of information utilized in what level will contribute the "best quality" of a decision result and their tradeoffs.

MODELLING/ANALYSIS OF SPACE BASED KINETIC ENERGY WEAPON PROJECTILE FLYOUTS

by

Carl G. Looney

ABSTRACT

The most critical capability of Kinetic Energy Weapons is that of hitting a target at large distances in space. Any analysis of the requirements to yield that ability depends upon a model of the projectile flyout that includes the sensor resolution/errors, the tracking errors for both target and projectile, algorithms for computing controls to cause an intercept, and a submodel for moving the target and projectile realistically. In this work we examine the needs and develop algorithms and a computer program for a model that will be usable in trade-off studies. Such trade-off analyses are to be used to define the required state-of-the-arts levels in sensing, tracking, guiding in space based defensive systems, and to compare systems proposed by contractors. The program code needs testing, validation and tuning to be ready for use in trade-off and performance analyses.

IMAGE FORMATION AND PROCESSING IN SUPERPOSITION EYES: PRECISION LOCATION OF POINT OBJECTS USING THE MOIRE EFFECT.

by

James S. Marsh

ABSTRACT

An investigation of image formation in insect eyes obeying a superposition model shows that multiple images of point objects are formed. This suggests a method for the precision location of point objects. The optical image is multiplied by a grating into an array of images which are projected onto an analyzer grating. The moire so produced allows location of the image to within a small fraction of the analyzer grating spacing. Replacing the analyzer grating with a photodetector array is proposed. The Fourier coefficient of the detector array corresponding to the period of the moire fringes is investigated. It is shown that the phase of the coefficient furnishes a high precision, relatively noise immune, determination of the image position.

CONTROL FUNCTIONS IN GRID GENERATION

by

C. Wayne Mastin

ABSTRACT

Grid generation techniques based on the solution of elliptic systems or variational problems may be used to make an algebraically generated grid smoother and more orthogonal. In the process, the distribution of points in the original algebraic grid may be altered. This report will develop techniques which include geometric control functions. The purpose of the control functions is to retain the same overall distribution of grid points from the algebraic grid while still giving a grid with a high degree of smoothness and orthogonality. These techniques are applied in the solution of a practical three-dimensional grid generation problem.

ACTIVE MODE-LOCKING TECHNIQUES FOR ULTRA-SHORT PULSES IN Nd:YAG LASERS

by

Odis P. McDuff

ABSTRACT

Active mode locking of an actively Q-switched cw Nd:YAG laser was accomplished and the laser's operating characteristics studied. Two-photon fluorescence and second harmonic enhancement were used in the characterization process. The two-photon-fluorescence technique was studied for operation at high cw power levels where thermal effects normally would be a problem. Intracavity etalon effects were considered. The behavior of the pulsed output in the time domain relative to the mode-locker drive signal was studied and related to a possible stabilization precedure.

A scheme was suggested for the attainment of a very stable, but yet relatively simple, synchronously pumped pulsed dye laser.

PLASMA PARAMETER DATA FOR BERT I CHAMBER TESTING

BY

BERNARD MCINTYRE

ABSTRACT

During the BERT I vacuum chamber test at the Johnson Space Center, NASA, cylindrical Langmuir probes were used to monitor the plasma parameters in the vicinity of the payload. Plasma data taken on a Langmuir probe close to the payload shows that during high current electron beam emissions, the return electron current depletes some regions of the test chamber of electrons.

FOURIER ANALYSIS OF THE PATTERN ELECTRORETINOGRAM

by

Leathem Mehaffey,III,Ph.D

abstract

The object of the present study is to analyse the pattern electroretinogram (PERG) using Fourier analysis. A Fourier interpretation of the PERG is that the "Luminance ERG" is contained in the fundamental and odd harmonics of the response, while the PERG is contained in the even (nonlinear) harmonics. Three monkeys (macacca mulatta) were used in this study. Stimulus patterns (horizontal bars alternated using either a sinewave or a squarewave counterphase signal) were generated on a monitor by a video pattern generator interactively linked to a computer which controlled both pattern generation and data acquisition. Both VEP's and PERG's were recorded. The signals were stored on the computer for later averaging and Fourier analysis. The preliminary findings presented in this report show that the technique of Fourier analysis as applied to the pattern ERG is sensitive to small changes in the response amplitude and phase; it can reliably detect signals as small as 0.5 to 1 microvolt, using averages of 30 or perhaps fewer responses. Compared to traditional methods this sensitivity represents a substantial improvement, while also providing greater ease of use, and improved objectivity. The study has provided evidence that at least one even harmonic, here the second harmonic, exists and may behave substantially differently from the fundamental. Another finding is the oscillatory nature of the recovery of amplitude of the PERG following a laser flash . This observation has not previously been reported, although a similar phenomenon has been observed in ganglion-cell recovery from laser flashes The correlation of PERG with ganglion cell behavior lends credence to the theoretical origin of the PERG with the ganglion cells.

PROFILING AIR FORCE FAMILY WORK GROUPS TO OPTIMIZE SERVICE SATISFACTION AND CAREER COMMITMENT IMPACT

by
Ivor S. Mitchell

ABSTRACT

Air Force members make career commitment decisions on both work and nonwork-related variables. The study shows that while members' own attitudes and demographics are important influencing factors on commitment, the work-family dyadic relationship produces attitudes which account for significant variations in career commitment.

An Air Force career commitment model is presented with frequency of use and satisfaction with Air Force services as mediating factors in career commitment. In order to effect greater precision in targeting, the study identifies attitudinal and demographic profiles of the heavy-user, light-user, and non-user, as well as the highly satisfied, moderately satisfied, and dissatisfied consumer of Air Force services. Based on these identified user-needs and user-categories the study suggests the tailoring of programs to Air Force family work group needs instead of trying to alter their need patterns.

Dr. Osoma Mostafa

NO REPORT SUBMITTED

Dr. Rex Moyer

NO REPORT SUBMITTED

NORMOBARIC OXYGEN CONCENTRATION EFFECTS ON CULTURED MOUSE MACROPHAGE RESPONSES

by

James J. Mrotek

ABSTRACT

This project was initiated to explore the possibility that hyperbaric oxygen accelerates wound healing in Air Force personnel by effects on macrophage free radical production and phagocytic activity.

The purposes of this investigation were: (a) To measure free radical production by these cultures after incubating them at 37° C with oxygen concentrations of 158, 76, 38, and 0 mm Hg (at 1 atm) for 45 min. (b) To develop cell culture models for evaluating hypotheses concerned hyperbaric oxygen effects in wound healing, thereby minimizing animal requirements.

Time-dependent luminescence changes by RAW264 macrophages were determined before and after incubation with various normobaric oxygen concentrations. To control for possible differences in flask envirnment, each flask was bisected, half the cells were scrapped from the flask, and suspensions were immediately assayed for luminescence (pre-gassing control). The unscrapped cells remaining in the culture flask were exposed at 1 atmosphere to constant gas flows containing one of four different oxygen concentrations. Pre-gassed controls were used to normalize data from gassed flasks; the relative uniformity among ratios from a particular flask and, in most cases, between flasks receiving a similar treatment made this approach seem appropriate. Ratios from cells treated using oxygen at 158 mm Hg are from 2 - 20 times higher than those from cells treated using only nitrogen. Future experiments must be more closely examined to determine viability of cells before and after exposure to various oxygen tensions; logistical problems prevented this in the present studies. Because of variablility in data from the three flasks treated with oxygen at 76 mm Hg, no trends can be discerned. It may be that oxygen tensions at 76 mm Hg are threshold concentrations for these macrophages. Treating cells with oxygen at 38 mm Hg may result in increased ability to produce luminol-sensitive products. If this effect is real, it argues that these cells should be cultured in atmospheres more closely approximating those *in vivo*. Future studies will determine whether oxygen tensions between 38 mm Hg and 0 (i.e., those approximating physiological conditions) improve macrophage function. Our experimental data must be interpreted cautiously because several experiments contained technical difficulties.

ISOTHERMAL DIFFERENTIAL SCANNING CALORIMETRIC STUDIES OF THERMAL DECOMPOSITION OF 1,4-BUTANEDIAMMONIUM DINITRATE

by

Maurice C. Neveu

ABSTRACT

The kinetic deuterium isotope effect was determined at 265, 270, and 275°C for the induction period of the decomposition reaction of an explosives component, 1,4-butanediammonium dinitrate (BDD), and hexadeutero-1,4-butanediammonium dinitrate (BDD-d_6) in which the hydrogen atoms on the nitrogen atoms have been replaced by deuterium atoms. The k_H/k_D ratio was found to be 1.09, 1.11, and 1.33 at 265, 270, and 275°C, respectively. The faster rate for the protium compound can be interpreted as indicating C-N bond breaking in the rate determining step. The corresponding activation energies are 68.9 and 57.5 kcal/mole for BDD and BDD-d_6, respectively.

A STUDY OF THE RELATIONSHIP BETWEEN LEADERSHIP AND JOB SATISFACTION/CAREER COMMITMENT AMONG AIR FORCE PERSONNEL

by

Robert E. Niebuhr

ABSTRACT

Using the data base of the Air Force's Organizational Assessment Package (OAP) it was found that a positive correlation existed between leadership behavior and both job satisfaction and career commitment intentions. Additionally, the relationships involving supportive leadership behaviors provided more positive correlations than did instrumental (structuring) leadership behaviors. It was also found that organizational tenure moderated the relationships between leadership behaviors and career commitment intentions--individuals who had been in the service a shorter time (low tenure) had much lower perceptions of leadership supportive behaviors than did high tenure individuals.

This finding is particularly noteworthy given the high attrition rate of first term personnel. The apparent lack of meaningful leader-follower exchanges for low tenure individuals and the corresponding low retention of these same individuals provided sufficient cause for making several specific recommendations regarding military views of leadership and needed leadership training. The results from the study also provided sufficient incentive to investigate further leadership/satisfaction/retention phenomenon across various functional areas (operations, maintenance, resource) and personnel categories (offices, enlisted civilian).

A REVIEW OF RESEARCH LITERATURE ON THE MEASUREMENT OF FORCES/PRESSURES ON THE PLANTAR SURFACE OF THE FOOT DURING GAIT USING AMBULATORY TRANSDUCERS

by

Marion L. Noble

ABSTRACT

The development of an instrumentation system to inobtrusively measure the time course of forces/pressures on the plantar surface of the human foot during gait is the beginning of a multi-stage project that aims to increase the knowledge and understanding of bone deterioriation and its prevention during prolonged exposure to microgravity. The most expedient approach to this problem was to review the pertinent research literature so that the appropriate features of systems with similar requirements could be incorporated into the design of the system prior to the development stage. More than 100 studies were collected and reviewed with approximately half of them included in a written report. The report began with an overview of the nature of the various transduction methods including strain gauge, magnetoresistive, capacitive, piezoresistive, and piezoelectric transducers. Recommendations based on this review and the requirements of the measurement system to be developed were made.

A SILICON VIDICON SYSTEM FOR PROFILING 1.06 μm LASER PULSES

Robert M. O'Connell

ABSTRACT

A P.A.R. 1252E silicon vidicon and P.A.R. 1216 vidicon controller were interfaced to an RCI Trapix 5500 image processing system for the acquisition, display, and analysis of images of 1.06 μm laser pulses. Requirements for the transmission and display of geometrically accurate images were established. It was found that a given pixel clock period and programmed channel time uniquely determine the channel length in pixels that must be programmed to maintain geometric accuracy. Measurements were made of the spatial uniformity and temperature dependence of the vidicon target's dark current and 1.06 μm detection sensitivity. The results revealed acceptably low peak-to-peak variations of both dark current and sensitivity throughout the central 3 mm x 3 mm area of the target and an optimum signal-to-noise level at a target operating temperature near 0° C. Efforts to improve the pulsed linearity of the vidicon using the cathode voltage switching method showed that some improvement is possible with a cathode voltage of 6.5 volts. Before higher cathode voltages can be used, however, the Trapix display saturation level has to be raised. With a cathode voltage of 6.5 volts, the pulsed linear dynamic range of the vidicon is approximately 4.

FREE RADICAL SPECTRA OF PO

by

Ralph Oberly

and

Mary Anne Hudson

ABSTRACT

A spectroscopic study of phosphorus monoxide, or PO, has been undertaken to determine the feasibility of using this spectra as a detection mechanism for certain chemical warfare agents. The B-X band system was selected for study based on equipment available in the laboratory. Several relevant papers were then found through a literature search on this topic.

The preliminary experimental program has produced PO band head emission spectra in the 325 nm region in preparation for looking for LIF band head emission spectra. A computer program has been written for an Apple II computer that calculates the line positions for all branches in the PO B-X band system. These line positions can be used to determine the location of band heads in the spectra.

ATR PERFORMANCE VS IMAGE MEASUREMENTS

By

Won J. Park and Barbara S. Carruth

ABSTRACT

This report describes the theory and methodology use to relate ATR (Automatic Target Recognition) performance with set of image measurements and human target recognition performance. Statistical techniques described include regression analysis, robust regression, and analysis of binary data.

Blast propagation through a composite wall section.

by

Desmond N. Penny Ph.D., P.E.

ABSTRACT

This report concerns the appropriate design for the outside walls of a protective structure. The threat considered here is that of a conventional bomb. The blast wave from such a device impinges on the wall of the structure and propagates into its interior, causing spalling, fragmentation and structural weakening.

Dissipation of this blast energy is a primary consideration of this investigation. A composite wall section is proposed to cause partial reflection of the blast energies at different interior boundaries of the wall. This partial reflection prevents a large build-up of tensile stresses at any boundary, and thus prevents spalling. A finite element model is developed using the ABAQUS code, to analyse this structural wall section.

ABSTRACT

NOVEL MEANS OF FORMALDEHYDE ANALYSIS
ADAPTED TO USAF LABORATORY NEEDS

by

Thomas Pierce, Ph.D.

The USAF OEHL must possess the means to efficiently perform the analysis of formaldehyde-in-air. The topicality and broader interest in this subject is revealed by a recent review covering only two years of papers in this area which reveals some 42 entries (1).

During this study, current advances in monitoring technology were evaluated and adapted for possible USAF OEHL use. Specifically, reported advances in liquid and ion chromatography were shown to possess needed attributes and a commercially-available kit for "field-use" colorimetric analysis was evaluated.

All experiments described here should be treated as preliminary in nature; it is estimated an additional six month-two year period is necessary to address this problem. A grant proposal is being submitted to the USAF Office of Scientific Research to continue this work.

RAMAN SPECTROSCOPY OF GLYCOSAMINOGLYCANS FROM CORNEA

by

Boake L. Plessy and Barbara Wilson

ABSTRACT

Research was continued in the development of Raman spectroscopy as a non-invasive probe to monitor structural changes in glycosaminoglycans from cornea as a function of the development, maturation, and senescence of the selected species. Keratan sulfate and chondroitin-4-sulfate extracted from bovine cornea were characterized and further fractionated by alcohol precipitation in preparation for spectroscopic examination by laser Raman techniques. Infrared spectroscopy and classical colorimetric methods indicated one relatively pure sample of each glycosaminoglycan expected. Development of a laser Raman spectrometer based on commercial Jarrell-Ash and Bausch and Lomb 0.5 meter Ebert type monochromators was initiated. Spectral bands were observed for several compounds using a single monochromator mode and stray-light was significantly reduced in a dual-monochromator mode. The results indicate that a cost effective Raman spectrometer system can be developed around commercially available optical and electronic components.

PREDICTION OF SURFACE ROUGHNESS EFFECTS ON HEAT TRANSFER AND SKIN FRICTION

by

Arnold Polak

ABSTRACT

Results are presented from a theoretical study of heat transfer and skin friction in a compressible two-dimensional turbulent boundary-layer over a rough surface. The turbulence structure of the flow is modeled with an eddy viscosity approach of Cebeci-Smith, and the roughness is represented by arrays of uniformly distributed drag force and heat source/sinks. Solution to the governing equations are obtained by a finite difference implicit numerical method. Results compare relatively well with low speed experimental data, although some discrepancy is observed when compared to a similar prediction method.

The Influence of Condensed Water Revaporization on Wind Tunnel Test Results

by

Dr. Justin H. Poland

ABSTRACT

A study was made of the effect of evaporation of condensed water in a shock wave on the flow downstream. The describing equations for two dimensional and conical flow fields were derived and numerical results were calculated for some two-dimensional flows with complete evaporation in the shock. The evaporation of 0.7 to 1.4 percent condensed water mass fraction in flows with upstream Mach numbers of 2.1 to 3.7 respectively changed downstream flow parameters by 2 to 5 percent for normal shocks, and by 7 to 30 percent for the weakest possible oblique shocks when compared to dry flows through the same shocks. A brief survey of the state of the art in modelling the rate processes of homogeneous nucleation and droplet evaporation revealed that the present models to predict the onset of nucleation are too complex to be accomodated in anything but a one dimensional flow code. It was also found that droplet evaporation has been successfully modelled although the models have not been applied to the conditions of interest in supersonic flows of the Mach number range studied here.

STUDY OF SYSTEM IMPAIRMENT DETECTION AND CLASSIFICATION ALGORITHM FOR AN UNMANNED RESEARCH VEHICLE

Kuldip S. Rattan

ABSTRACT

System impairment detection and classification (SIDC) algorithm for actuator failures is studied in this effort. The objective of this research is to evaluate the SIDC algorithm of ALPHATECH, INC. which is capable of detecting, isolating and classifying control surface failure and apply this algorithm to detect and classify the actuator failures of the unmanned research vehicle (URV). This algorithm can detect the presence of stuck, floating and partially missing control surfaces and is based on decentralized residuals. Log likelihood ratio (LLR) and sequential probability ratio (SPRT) tests are used in hypothesis testing for the failure detection and isolation (FDI) algorithm. Recommendation for further research in the area is given.

NONLINEAR ANALYSIS OF COMPOSITE SUPPORTS FOR ARMOR

by

HEMEN RAY

ABSTRACT

Finite element solution for the deformed shape of the composite supports for armor indicates that the idealized single-degree-of-freedom model for the armor system is reasonable as a first approximation. In order to obtain more accurate and realistic results, the materials for the supports for armor are considered nonlinear because isolators are usually very nonlinear. The method of nonlinear analysis for composites as developed by Sandhu have been studied and will be used to analyze the problem.

DIAGNOSTICS OF SOLID PROPELLANT COMBUSTION

by

John P. Renie and Brian K. McMillin

ABSTRACT

This report details the summer activities at the Air Force Rocket Propulsion Laboratory of a Summer Faculty Fellow and a Graduate Student in the field of diagnostics as applied to the study of solid propellant combustion. At the onset of the research effort, a detailed literature review of diagnostic techniques was pursued with particular emphasis placed on those methods that are optical in nature, and therefore, non-intrusive. Also, strong emphasis was directed to the laser-based techniques currently being used to determine both temperature and species concentration in a reactive system such as the combustion zone above a deflagrating solid propellant surface. Experimental investigations were conducted in the AFRPL servo-controlled combustion bomb which permits extended observation of the combustion event. A particular class of solid propellant formulations was selected for investigation - this being a series of AP/HTPB composite propellants wherein the oxidizer particle size distribution was carefully monitored. In summary, the laser-based diagnostic technique referred to as laser-induced fluorescence (LIF) is considered to be a good candidate to use to determine temperature and species data in solid propellant flames, however, continued research is warranted since the reaction zone is very complex with quantitative analysis of such data suspect at best. In addition, spectroscopic emission data for the radical species involved in the combustion reaction can easily be obtained with such data lending credence to the claim that reactions are occurring at a much larger distance from the propellant surface then theoretically modeled.

CONSTRUCTION OF APPROXIMATE FORMULAE FOR THE CALCULATION OF CONDUCTIVITY COEFFICIENTS IN PARTIALLY IONIZED GASES

by

MICHAEL BARRY RHODES

ABSTRACT

A Green's Function method for the solution to the Boltzmann-Fokker Planck equation for a homogeneous plasma in the presence of weak field gradients is presented. Because of the difficulty associated with the numerical solution of the BFP it is desirable to have alternate slightly less accurate methods or mixture rules to calculate conductivity coefficients. As a byproduct of the Green's Function solution a method for generating mixture rules is suggested.

A LITERATURE SURVEY ON THE FORMATION AND LUMINESCENCE OF $NO(A^2\Sigma)$ IN A HYDRAZINE/N_2O_4 PROPELLANT SYSTEM

by

Robert W. Ricci, Ph.D.

ABSTRACT

The exhaust plume of a rocket charged with an unsymmetrical dimethylhydrazine/nitrogen tetroxide (UDMH/N_2O_4) propellant emits considerable radiation in the ultraviolet region of the electromagnetic spectrum. Nitric oxide and to a lesser extent $CO(4^+)$ and OH radicals are three sources of this radiation. Improved methods of missile surveillance could result from the detection of the distinctive plume signature resulting from the ultraviolet radiation emitted by these and other species present in the exhaust of rockets employing UDMH/N_2O_4 propellants. The object of this study was the completion of a literature survey on the available technical reports and journal articles pertaining to the formation and luminescence of $NO(A^2\Sigma)$ in the exhausts of rockets fueled by UDMH/N_2O_4.

NUMERICAL MODELING AND INVERSION OF 63 μm EARTHLIMB EMISSION FROM ATOMIC OXYGEN

by

James P. Riehl

ABSTRACT

Simulated earthlimb radiance and spectral lineshape data for the 63 μm (158.5 cm^{-1}) transition ($^3P_1$ -> $^3P_2$) of atomic oxygen has been generated from several assumed oxygen ground state density, temperature, and pressure atmospheric profiles. The simulations have been accomplished by modification and application of a version of the NLTE computer code written at the Air Force Geophysics Laboratory. An inversion procedure has been formulated, and a computer program written, that is able to successfully recover the excited state density and temperature for a wide range of tangent heights from the model radiance data. The region successfully treated includes high tangent heights where the transition can be considered "thin", and the edge of the earthlimb where effects due to self-absorption begin to appear. Considerable progress has also been made in continuation of the inversion to lower altitudes.

Dr. Michael Ross

NO REPORT SUBMITTED

ABSTRACT

NONDESTRUCTIVE EVALUATION OF ADVANCED COMPOSITES BY STRAIN FIELD ANALYSIS ACQUIRED THROUGH CORRELATION OF X-RADIOGRAPHS

by

Samuel S. Russell

Displacement and strain fields were determined by correlation analysis between radiographs of a specimen in unstrained and strained states for a $[90,0]_s$ glass-epoxy coupon. The error of these measurements was less than 3% when compaired to an extensometer. The same coupon was then subjected to an impact in the gage length, which caused radical shifts in the strain field. When subjected to a tensile load, negative strains were measured locally in the damage zone using the X-radiograph correlation method, clearly identifing the flawed region.

INFRARED RADIATION TARGET MODELING SYSTEM

by

Sally A. Sage

ABSTRACT

A description is given for an infrared radiation (IR) target modeling system. The goal of the system is to generate an IR signature for the target. Initially, the target is modeled by a set of triangular facets which completely cover the outer surface of the target. The first of three tasks is to use the three-dimensional model to produce a two-dimensional image which has been processed by a hidden-line algorithm so that the image is represented by a set of pixels. Each pixel has a correspondence to a facet that is directly in the sensor's line-of-sight. The IR target signature can then be calculated by the integration of the radiance over the projected area of the target along the line-of-sight of the sensor. The second task is to develop a similar facet model for the plume of the target. The plume also makes a significant contribution to the IR signature and should be incorporated into the modeling system. The third task is to develop an interactive system to identify specific regions of the target surface, namely the facets covering the engine. The engine facets have a significantly higher temperature than the other regions of the target and these temperatures contribute to the IR signature.

MODELING OF TIRE/SOIL INTERACTION

BY

JOSEPH E. SALIBA

ABSTRACT

The viscoplastic finite element program for modeling Tire/Soil Interaction has been shown to be a powerful analytical tool that has a significant promise for improving the Air Force ability to predict aircraft ground operation.

A brief review of the mathematical theory of viscoplasticity and the computational procedure used in the finite element program is first presented. Next some of the capabilities of this powerful analytical tool are demonstrated. The first example considered is that of the effect of tire pressure on sinkage and rut depth produced on constant strength clay and sand soils. Then, the effect of layered soil on sinkage and rut depth is examined considering the possibility of both soft over hard as well as on hard over soft layers. This latest case is further studied investigating the effect of the variation of the top thickness layer on sinkage. In conclusion, a set of tables were shown that provided an equivalent cone index for a two layered clay soil of different strengths and thicknesses. To demonstrate the capability of the program to model contingency surfaces, the behavior of standard flexible and rigid pavements under a medium tire pressure were considered.

Finally, it is recommended that work hardening/softening models be identified and included in the routine to provide urgently needed ability for analytically modeling the tire multi-pass phenomenon.

BACTERIOLOGIC TECHNIQUES FOR THE ISOLATION OF LEGIONELLAE FROM AQUATIC ENVIRONMENTS

by

Gordon D. Schrank

ABSTRACT

Effort was directed at defining methods for the isolation of Legionellae from aquatic environments. Organisms can be isolated from both potable and nonpotable water using selective culture media. Bacteria in samples must be concentrated by centrifugation. Neither vacuum or pressure filtration is recommended in most routine applications. Recovery of Legionellae from heavily contaminated specimens is facilitated by acid treatment of the concentrated sample before plating. Prolonged exposure of samples to low temperatures (2-10°C) is not recommended. Direct fluorescent antibody staining of specimens may be useful in final identification of organisms. However, it is not recommended for screening purposes.

More basic research is needed regarding the flagellar antigens of Legionellae. Only crude preparations have been characterized to date. Methods for isolating and propagating phage lytic for Legionellae are needed. Preliminary work was completed in both of these areas.

CHEMICAL LASER RESEARCH ON THE IODINE MONOFLUORIDE (IF) SYSTEM

by

RONALD M. SEGA

ABSTRACT

The research direction was shifted from a focus on the iodine oxide (IO) system to the iodine monofluoride (IF) system. When C_3F_7I gas was substituted for I_2 as a source of iodide, mixed with O_3 and excited by a KrF excimer laser, the resulting spectra was positively identified as IF(B). Several aspects of the experimental set-up including the O_3 generation cell, O_3 detection system, and spectroscopy system were redesigned and tested to provide increased accuracy for data acquisition. The IF system has been under investigation at the Air Force Weapons Lab for a number of years but has not been generated in this manner.

MODELING THE TISSUE SOLUBILITIES OF HALOGENATED METHANES, ETHANES AND ETHYLENES

by

Paul G. Seybold, Ph.D.

and

Michael A. May

ABSTRACT

Experimental solvent:air and tissue:air partition coefficients for 25 halogenated methanes, ethanes, and ethylenes in saline solution, olive oil, and rat blood, muscle, liver, and fat tissues have been examined using theoretical molecular modeling techniques. Two graph theoretical approaches (the distance method of Wiener and the connectivity index method of Randić, Kier, and Hall) and an approach utilizing ad hoc molecular descriptors were employed. Satisfactory regression models were obtained with both the Randić-Kier-Hall approach and the ad hoc descriptors approach. The latter method revealed that fluorine substituents decrease tissue solubilities, whereas both chlorine and bromine substituents increase tissue solubilities, with the relative influence being Cl < Br. Tissue solubilities could also be conveniently represented in terms of contributions from oil and saline solubilities.

DIGITAL SIMULATION OF SURFACE-TO-AIR MISSLES AND SMOOTHING OF CINETHEODOLITE AND RADAR DATA

by

Shawky E. Shamma

Abstract

This report summarizes the activities of the participant during his SFRP. It consisted of:

1 - examination of existing models which are used by the sponsor for "digital simulation for the dynamics of surface-to-air missiles" and making recommendations for implementation of more accurate methods.

2 - examination of the methods that are currently used by the sponsor for smoothing and analyzing cinetheodolite and radar data for missiles and bombs.

3 - conducting seminars for the research staff on "critical phenomena in digital signal processing" and "applied time series forecasting and control."

INDOOR RADON POLLUTION

by

Ralph W. Sheets

ABSTRACT

Indoor air pollution by radon-222 and its radioactive decay daughter products constitutes a significant health risk to those who live in houses or work in buildings with higher than average concentrations. Possibly hazardous sites which may be of concern to the United States Air Force include radium storage areas, missile silos, and housing built over lands suspected of having elevated concentrations of radium. This report describes apparatus and methods which were developed to give the USAF Occupational and Environmental Health Laboratory a capability for on-site monitoring of airborne radon and its daughters. Details of assembly, calibration, and testing of portable sampling kits are described, and results of field measurements made with these kits are reported. It is recommended that these kits become permanent inventory items within the Radioanalytical Services Branch of the USAF OEHL, and that they be used to determine if indoor radon decay products exposure at suspected sites are elevated to a point where they pose a health hazard to occupants.

Reliability of Systems with Markov Transfer of Control

Kyle Siegrist

ABSTRACT

This report concerns systems (primarily software systems) which can be decomposed into a finite number of modules. It is assumed that control of the system is transferred among the modules according to a Markov process. Each module has an associated reliability which gives the probability that the module will operate successfully when called and will correctly transfer control when finished. The system will thus either fail or eventually complete its task successfully and enter a terminal state. The reliability of the system is studied in terms of the module reliabilities and the transition probabilities. Improved methods of predicting system reliability, allocating module reliability, and determining module sensitivity are developed. Special branching and sequential systems are studied in detail. Modeling questions are explored and recommendations made.

THE SYNTHESIS OF REACTIVE INTERMEDIATES

by

Dr. Ricardo A. Silva

ABSTRACT

This report describes progress in the application of new synthetic methodologies leading to the transformation of readily available materials into new reactive intermediates capable of further conversion to compounds which have been shown to be useful in the formulation of solid propellants.

The report describes the successful synthesis and characterization of a number of such new reactive intermediates including two new tristriflates from 2-methyl-1,2,3-propanetriol and 1,3,5-pentanetriol; one new ditriflate from 4-trifluoroacetoxy-1,5-pentanediol; one new trifluoroacetate from 4-hydroxytetrahydropyran; and a new trispyridinium salt, 1,2,3-tripyridiniumpentane tritriflate.

The attempted transformation of some of these reactive intermediates into propellant ingredients is described. However, the limited tenure of this work precluded completion of this part of the project. This is an area that warrants continued study.

Recommendations regarding culmination of the objectives of this project are discussed as are logical extensions of this work to include the synthesis of more energetic materials for incorporation into propellant formulation.

POSSIBLE TARGETS FOR TESTING THE NEUTRAL PARTICLE BEAM AT LOW ENERGIES IN THE MARK I AEROSPACE CHAMBER

by

Dr. S. Ballou Skinner

ABSTRACT

Carbon, aluminum, silicon, liquid helium, ice, iron, platinum, and lead were examined as possible targets for testing the neutral particle beam at low energies in the MARK I Aerospace Chamber in an effort to select a target which would give the fewest nuclear reactions and therefore the smallest radiation hazards to the chamber and the personnel. The first test will probably use a neutral particle beam of approximately 1 Mev. Subsequent testings may use beams of higher energies up to approximately 20 Mev. For each target the following were calculated or literature researched: coulomb barrier, threshold energies for (p,γ) and (p,n) reactions, reaction cross sections, radiactivity of the residual nucleus, stopping range, and heat properties. For carbon and aluminum, gamma yields and shielding estimates were made. For energies above the (p,n) threshold, the danger of neutron activation is acknowledged. A calculation is made for neutron activation in aluminum. For the first test using 1 Mev protons, aluminum or carbon will probably be used as a target for the neutral particle beam.

Preparation of Non-flammable Model Compounds

Abstract

Merrill Smith

The reaction between perfluoroalkyl iodides and excess anhydrous aluminum bromide proceeds spontaneously at room temperature and results primarily in the corresponding 1,1,1-tribromoperfluoro alkane, according to the equation:

$$CF_3(CF_2)_nI + AlBr_3 \longrightarrow CF_3(CF_2)_{n-1}CBr_3$$
$$n = 5, 7$$

Control of the reaction is greatly facilitated by dissolving the aluminum bromide in methylene bromide solution. Yields ranged from 38% to 77%. The reaction between aluminum bromide and perfluoroalkyl bromides is not spontaneous at room temperature.

A mixture of perfluoroalkyl iodides was converted to the corresponding perfluoroalkyl bromides by reaction with bromine. Pure samples of $C_6F_{13}Br$, $C_8F_{17}Br$, and $C_{10}F_{21}Br$ were isolated by means of precision distillation and crystallization.

Several exploratory and/or confirmatory experiments were carried out to establish the generality of reactions of perfluoroalkyl halides with metal halides.

STUDIES ON COMBUSTION OF LIQUID FUEL SPRAYS IN STAGNATION FLOWS

by

S. H. SOHRAB
Department of Mechanical and Nuclear Engineering
Northwestern University

ABSTRACT

The report introduces studies on steady combustion of polydispersed sprays of liquid kerosene, heptane, octane and ethyl-alcohol in the stagnation-point flows. The burner assembly is designed to produce polydispersed sprays of the fuels within the background gaseous methane/air mixtures. Thus, steady combustion of these fuels within a planar flame adjacent to the boundary layer near a quartz plate can be studied. Using the laser sheet lighting for photography, the flow field as well as droplet size and distribution throughout the pre and post flame regions are investigated. Photographs of burning kerosene droplets as they pass through planar lean methane/air flames are presented. Also, preliminary results on combustion of heptane, octane and ethyl-alcohol sprays in lean methane/air mixtures are discussed. The potential implication of the experimental model to future study of the structure, extinction and stability of poly and monodispersed spray combustion is emphasized.

Monitoring Environmental Quality by Metabolite Analysis

by

Richard G. Stebbins

ABSTRACT

The USAF has an interest in determining the extent of its culpability for environmental damage caused by its more heavily used products such as JP-4 jet fuel, insecticides, and plane deicer. The transient nature of the toxic components of some products in the environment makes specific chemical monitoring of suspected spills problematic. Bluegills were separately exposed to the insecticide malathion and JP-4 jet fuel and their livers and gut analyzed for the toxic components and metabolites of these components. The analyses and the feasibility of using such analyses to monitor environmental quality is discussed.

ANALYSIS OF GEOMETRIC ATTENUATION IN GROUND MOTION TESTING

by

Dr. B.W. Stewart

ABSTRACT

A simple analytical method was used to investigate geometric attenuation effects in explosive soil testing. Dispersion, nonlinearity, and media attenuation were not examined. The method was used to arrive at several conclusions concerning explosive source array characterization and the definition of various scaling regions.

Competition Guide for

Base-Level Buyers 1985

by

Lowell E. Stockstill

ABSTRACT

Competition Guide for Base-Level Buyers 1985 is in keeping with the COPPER 90 goal of providing on-the-job learning. The Competition in Contracting Act of 1984 (CICA) trigger this specific project.

This publication provides the base-level buyer with a quick reference to competition. It gives an overview of the new law, highlights some of the specific features, and provides a source list for competition.

The "Guide" is written in "cookbook" style. It is general enough to include all sizes, branches, and experience levels in base-level contract. It has all of the advantages and disadvantages of this approach.

Although the emphasis of the publication is competition the desired end is to assist the base-level buyer lower the cost of government procurement.

ABSTRACT

William L. Stone

Hyperbaric oxygen treatment was found to adversely affect the electrophysiological response of the retina to light in rats fed a basal diet deficient in both vitamin E and selenium (the B diet). Both vitamin E and selenium are micronutrients that play essential roles in preventing in vivo lipid peroxidation. After 4 weeks of hyperbaric oxygen treatment (3.0 ATA of 100 % oxygen, 1.5 hrs per day, 5 day/week) rats fed the B diet deficient in vitamin E and selenium showed decreased ($p < 0.005$) in a-wave amplitudes (83$\pm$13 uV, N=8) and b-wave amplitudes (255$\pm$30 uvolts) compared with a-wave amplitudes (151$\pm$12 uV, N=17) and b-wave amplitudes (369$\pm$29 uvolts) for rats fed an identical B diet but not treated with hyperbaric oxygen. Rats fed a basal diet supplemented with both vitamin E and selenium (the B+E+Se diet) or with vitamin E alone (the B+E diet) showed fairly constant a- and b- wave amplitudes that did not decrease after 4 weeks of hyperbaric oxygen treatment. Dietary antioxidants appear to provide protection from hyperbaric oxygen damage to the retina.

ASSESSMENT OF MAXIMUM ENTROPY METHOD SOFTWARE FOR TREATMENT OF DATA FROM THE AFGL LABCEDE FACILITY

by

James E. Sturm

ABSTRACT

Software available for reduction of interferometric data by the maximum entropy method (MEM) was used to study the effectiveness of this method in presenting emission spectra from high level Rydberg states of atomic oxygen excited in the AFGL LABCEDE facility. The MEM treatment at higher orders generated fine structure which was not ascribable to known transitions of oxygen atoms.

Interferograms representing model spectra, one without and one with added noise, were fabricated for use with the software. Results of both fast Fourier transform (FFT) and MEM treatments are compared. While the FFT operation reproduced the model spectrum in each case, the MEM treatment tended to overemphasize major peaks. It also produced narrower and spurious peaks, especially in the absence of noise and at higher orders. It is recommended that the code be tested for fidelity to the MEM algorithm.

Inference Propagation in Emitter, System Hierarchies

by

Thomas A. Sudkamp

ABSTRACT

Passive sensors receive signals and generate evidential structures which represent a hypothesis of the type of emitter which produced the signal. The evidence is inexact due to environmental constraints, limitations of the sensors and the lack of knowledge of the emitter characteristics. Emitters are combined to form threat systems producing a hierarchy through which the evidence must flow. A representation for the evidential structure, methods for combining evidence and inference mechanisms for propagating support through the hierarchy must be established as a basis for an expert system which identifies threats in a hostile area. The applicabilty of the Dempster-Shafer theory and inference networks as representations of emitter/system hierarchies are examined. It is shown that the inference mechanism should be restricted to the hierarchical levels with an independent transfer of information from level to level.

PARTICLE SCATTERING IN PLUMES

by

WILLIAM HOLT SUTTON

ABSTRACT

The modelling of radiation heat transfer within the exhaust plumes of aluminized solid fuel rocket motors was the subject of this research effort. This work is very important in analyzing near field infrared test results and in benchmarking simpler models in the JANNAF SIRRM code. The problem of base heating of the rocket nozzle and adjacent components is also within the realm of the current research.

A finite, conformal-cylindrically symmetric, variable property, anisotropically scattering model subject nozzle heating conditions was formulated. A discrete ordinates numerical solution was generated for this problem. The model is currently being tested against simpler one dimensional cylindrical solutions.

Thermal Stability of Al-Fe-Ce Alloys

by

Robert E. Swanson

Abstract

Two Al-Fe-Ce alloys produced by the melt-spinning rapid solidification processing technique have been annealed and characterized in terms of thermal stability. Various means have been used to characterize microstructure, including scanning electron and transmission electron microscopy, differential thermal analysis, and electron microprobe. Microhardness measurements of two distinct solidification zones were also used to assess thermal stability. Microstructural differences included cruciform-shaped particles in the as-cast quarternary alloy and acicular particles in the quarternary alloy annealed at 1000°F for 2 hours. Two exothermic reactions were found for the ternary alloy; only one for the quarternary alloy. The lower overall hardness of the quarternary alloy was related to decreased cooling rate via poorer wetting of the melt-spin wheel. Additional work is recommended for both systems.

The F-15 SPO Support Equipment "Tiger Team"

by

Patrick J. Sweeney, Ph.D.
R. Simon Insley, B.A.

ABSTRACT

As a result of the news media's recent exposure of a number of "overpriced" items purchased by the government and the subsequent pressure to avoid such news stories, the F-15 System Program Office (SPO) formed a "Tiger Team" to explore alternative methods of procuring support equipment (SE). The objectives of the team were to reduce costs on support equipment, eliminate overpricing, and serve as a test for developing a methodology for determining fair prices for SE.

Using component breakout procedures and criteria of criticality, complexity, drawing availability, and prime contractor termination cost reasonability, the team selected for consideration 118 of the over 3300 F-15 SE items. These 118 were identified to be procured from other than the prime contractor. It was not possible to compute the offsetting government costs as a result of these procurements from a small disadvantaged 8(a) firm, however, the gross savings were 78 percent.

The F-15 SPO is developing a checklist that should assist in future determinations of fair SE prices.

STUDIES IN HOLOGRAPHIC PROCEDURES

by

Charles E. Taylor

ABSTRACT

The use of dichromated gelatins has many advantages for recording holograms, especially when it is necessary to optimize the effiency of the process. John Lushetsky, under my general supervision, conducted studies which are described in detail in his report.

James Sirkis conducted studies on the use of fiber optics as strain sensors. The feasibility had been established previously and the purpose of the continued work was to develop the necessary recording instrumentation. The latter will be included in his report.

In addition, I developed some display holograms to emphasize the potential of the method. Particular attention was given to recording multiple holograms on a single plate.

DYNAMIC STRESS ANALYSIS OF LAYERED STRUCTURES

by

Joseph W. Tedesco

ABSTRACT

Protective military structures are typically constructed of massive, monolithic reinforced concrete slabs. This practice is considered necessary in order to protect personnel and/or vital equipment within the structure from the harmful effects of conventional weaponry. Recent studies have indicated, however, that "layered structures" may provide a viable alternative to conventionally hardened structures in certain environments.

This report presents the results of a finite element method (FEM) analysis of blast loading on layered structures. The results of this study indicate that layered structures are a viable alternative to conventional designs of hardened or semi-hardened facilities. However, due to the limited scope of this study, a follow-up, more comprehensive numerical analysis is recommended.

An EPR Study of the Decomposition of Various Dinitrotoluenes and the Synthesis of Azo Compounds

by

Walter E. Trafton, Jr.

ABSTRACT

The rates of decomposition of several dinitrotoluenes were studied and compared with the rate of decomposition of TNT. It was found that 2,4-dinitrotoluene behaved the most like TNT. Activation energies for all dinitrotoluenes were determined. Five different azo compounds were synthesized by reacting lithium aluminum hydride with aromatic nitro compounds. Work still remains to recrystallize and obtain the EPR spectra of these compounds. The intention here is to generate phenyl radicals when the azo compound is heated. Finally, a preliminary study of the reaction of t-butyl peroxide and TNT was performed. The reaction was found safe to run in the EPR cavity, although no signal was obtained when this was done. More work needs to be done in this area.

A COMPARISON OF MEASURED AND CALCULATED ATTENUATION OF 28 GHZ BEACON SIGNALS IN THREE CALIFORNIA STORMS

by

Larry Vardiman
and
Matthew Peterson

ABSTRACT

Three case studies of attenuation through stratiform and convective Sierra Nevada storms from the winter of 1979-1980 were studied. A 28 GHz (1.05cm) dual channel radiometer was positioned on the Sacramento Valley floor just upwind of the central Sierra. It measured the signal strength from the COMSTAR satellite and brightness temperature from the cloud along the same path. Microphysics data from a cloud physics aircraft were used to calculate attenuation and brightness temperature from the same cloud volume.

Measured and calculated values of attenuation for weak precipitation agree, however large differences for heavier precipitation do not permit a conclusion regarding the importance of snow above the melting layer on attenuation. Flight patterns used to acquire the hydrometeor data may have contributed to the differences.

ALLOCATION AND ASSESSMENT OF LOGISTICS RESOURCES

by

Dr. Daniel T. Voss

ABSTRACT

The Air Force Logistics Command uses analytic simulation models and marginal analysis techniques for balanced acquisition of reparable aircraft parts and assessment of resource levels. In this paper, inclusion of acquisition of such support resources as repair, transportation and administration is considered. Conditions are explored under which marginal analysis is optimal for acquisition of such resources, in light of a nonseparable objective function. Two marginal analysis based algorithms are recommended. Different methods are suggested for estimating demand rates and variance-to-mean ratios for reparable parts.

ABSTRACT

NATURAL LANGUAGE UNDERSTANDING USING RESIDENTIAL GRAMMAR AND ITS USE IN AUTOMATIC PROGRAMMING

by

Dr. Peter J. Binkert
Dr. Christian C. Wagner

Mr. Thomas L. Schnese
Ms. Frances M. Vallely
Ms. Kathleen A. Malin

The research outlined here focuses on the development of a methodology for the creation of a natural language interface. It includes a set of software tools and procedures based on a non-transformational theory of language called Residential Grammar (RG; Binkert, 1983, 1984, 1985). The development of the natural language tools began with two parallel efforts. The computer science team worked on the implementation of the LISP version of the RG syntactic parser of English, while the linguistic team concentrated on the development of a first set of semantic features out of which the case relations of language could be defined. Once completed, the natural language understanding tool could be integrated into a computer's operating system to act as an interface between a computer system and a computer user. This would reduce the confusion caused by the various command languages on different computer systems.

STABILITY AND CONTROL PROGRAM FOR CONCEPTUAL AIRCRAFT DESIGN

By

Dr. Richard C. Walker

ABSTRACT

The report is concerned with the method and code verification phase in the development of a computer program-SACP-which computes aerodynamic parameters and stability and control derivatives, for aircraft at the conceptual design level. A comparison of stability parameters obtained using SACP and the well established Digital Datcom is presented for a wing-body-tail configuration, as well as a comparison of SACP results with F-15 data. The generally good agreement of the comparisons indicates that SACP can be used with a good degree of confidence at the conceptual design level for the class of configuration investigated.

Abstract

Compilation of Select Aspects of the 1984
Air Force Weapons Laboratory History

by

Doris J. Walker-Dalhouse

The overall goal of the research appointment was to provide technical assistance in the collection of historical information pertinent to the mission of the Air Force Weapons Laboratory (AFWL) and in the writing of historical narratives on select AFWL programs assigned by the AFWL historian. To accomplish the designated task, interviews were conducted with specified Air Force personnel associated with the following administrative and technological units: AFWL Safety Office, AFWL Finances, the Rio Grande Research Corridor, and the Hard Mobile Launch Program. Subsequent historical narratives were written for inclusion in the 1984 AFWL History.

THE PLANNING OF A R & D OFFICE INFORMATION SYSTEM

BY

Yin-min Wei

A B S T R A C T

This study examined the needs of researchers and managers in a research organization for information and for information management support, and proposed a plan to provide those needs.

The principal components in the plan are: management information system with an hierarchical structure, direct online literature searches for the researchers, and establishing technical information analysis centers to provide local information needs as well as to serve other researchers in the country. In addition, if calendars of events of work-units and individuals are available in the computer network (even if partially) would improve communication within the organization and thus to quicken the flow of information. After all, the primary responsibility of a research organization is to search for new information.

Since computerized information storage and retrieval systems are used to complement the information in human brains. Thus information systems need the capabilities of human intelligence, and artificial intelligence is an important research area for information systems builders.

DEVELOPMENT OF HIGH STRENGTH BETA TITANIUM ALLOYS VIA RAPID SOLIDIFICATION PROCESSING

BY

I. Weiss

ABSTRACT

The development of high strength beta titanium alloys using rapid solidification (RS) approach is being addressed. Additions of boron, carbon, cerium and erbium have been made to Ti-6Al-4V, Ti-10V-2Fe-3Al, Ti-15V-3Cr-3Sn-3Al and Ti-20Mo in an attempt to dispersion or precipitation strengthen these alloys.

The primary concern in alloy preparation is uniformity of composition. The problem of segregation has been evaluated for the different alloys. Large scale macro segregation is found in Carbon and Boron containing alloys. Metastable supersaturation has been obtained by RS conversion utilizing the pendent drop melt extraction (PDME) process. The production of homogeneous RS material and the difficulties encountered are presented. The effect of various quench wheel materials on the cooling rate is examined. Thermal conductivity and thermal expansion are important parameters to consider in selecting quench wheel material. The finest RS microstructure with columnar grains 7μm thick is obtained utilizing mild steel quench wheel.

"POPCORN" AS A TOOL FOR FUTURE COGNITIVE WORKLOAD ASSESSMENT: A CONCEPTUAL ANALYSIS

by

SHIH-SUNG WEN

ABSTRACT

The present study was aimed at conceptually analyzing the degree to which the POPCORN, a supervisory control simulation system developed by NASA Ames Research Center, measures the cognitive processes of piloting. In light of the weakness of current measurement approaches and the characteristic cognitive demands of future aircraft and combat tactics, the result of analysis suggests that the POPCORN is capable of assessing both low and high cognitive processes and is a man-machine interactive measurement tool for the future. It was considered especially suitable for monitoring metacognitive ability of the pilot. The author strongly recommended that the POPCORN be validated through empirical data analysis. It was further suggested that a short-term study be conducted to investigate conditions under which metacognition is being monitored by the POPCORN.

LABELING THE TOPOGRAPHIC FEATURES OF A GRAY-LEVEL IMAGE

by

David C. Wilson

ABSTRACT

The purpose of this paper is to describe a method for labeling the topographic features of a gray-level image. The topographic features considered include peaks, ridges, cliffs, prairies, valleys, canyons, ravines, and sinks. This approach to Image Processing grew out of the Eglin Armament Laboratory's interest in identifying such high-value targets as buildings, bridges, petroleum tanks, and runways. In an infrared image buildings and petroleum tanks tend to appear as peaks and small ridges topographically, while bridges and runways tend to appear as large ridges. Since these peaks and ridges represent pixels higher than the average, the algorithm presented here is designed to focus on the connected components of those pixels at least one standard deviation above the mean. (The algorithm also considers components one standard deviation below the mean.) These connected components are then labeled according to the local topographic content of their pixels. For example, if a component has a significant percentage of peak pixels or ridge pixels, then it will be labeled a peak or ridge, respectively. The algorithm was successful in accurately labeling most components.

THE WAREHOUSE LAYOUT PROBLEM

by

Jesse Williams

ABSTRACT

This paper is concerned with developing a microcomputer model that will rearrange items within an Air Force warehouse from their initial locations to desired locations. Such a rearrangement is necessary since the present arrangement of items within these Air Force warehouses was not designed by scientific principles. An efficient design would minimize the total travel distance, which is the number of times an item is picked up times the distance from the warehouse storage location to the pick up and delivery. As demands for items change it is not efficient to have low demand items near pick up and delivery. A heuristic technique is developed for a microcomputer model which is to be used by base level personnel in the warehouse. The technique relocates items with higher demand closer to the pick up and delivery area.

A SUMMER'S STUDY ON NUCLEAR DEBRIS CLOUD RADIATION AND LASER TRANSMISSION IN THE ATMOSPHERE

by

Arthur Woodrum
Professor of Physics
Georgia Southern College

ABSTRACT

A simple mathematical model for calculating the estimated radiation dose of an aircrew in an aircraft flying through a debris cloud from a single nuclear detonation is developed. Suggested ways of creating a computer model for the growth of clouds from nuclear multibursts are made. A study shows that a measure of the "strength" of turbulence affecting the transmission of lasers through the atmosphere near ground level is given by the refractive-index structure coefficient which can be measured from a vertical temperature profile or from the resolution angle of two point light sources.

The Effect of Wavelength on Light Scatter in the Human Eye

by

B. R. Wooten

ABSTRACT

An optical system was constructed that allowed the psychophysical measurement of intra-ocular light scatter. Results showed that at the center of an annulus of 3 degrees inner and 8 degrees outer diameter light scatter was 1.3 percent and was independent of wavelength. These findings rule out Rayleigh scattering in the human eye.

Molecular Operators That Move Nuclei Along Paths of Constant Orbital Energy#

Carl E. Wulfman*

Frank J. Seiler Research Laboratory
United States Air Force Academy
Colorado Springs, Colo. 80940

ABSTRACT

Systematic methods have been developed for obtaining an increasingly accurate series of approximations to quantum mechanical operators with the following properties:

i. Given an initial nuclear configuration, and corresponding electronic orbital, the operators move the nuclei of a molecule along paths of constant orbital energy.

ii. The operators convert the initial orbital into eigenstates appropriate to each successive nuclear configuration.

Applying these methods to triatomics we have obtained a first approximation to such an operator. The accuracy of this and successive approximations is being assessed.

THE LQG/LTR DESIGN VIA H_2-OPTIMIZATION

by

HSI-HAN YEH

ABSTRACT

An H_2-optimization technique is adapted to solve the LQG/LTR problem. Repetitive computations for the sequence of filter or controller gains as some parameter approaches zero or infinity are avoided. The limit values of the LQG/LTR compensator are obtained in one iteration without involving infinite filter or controller gains. The configurations of the H_2-optimal compensator and the LQG/LTR compensator are compared.

HEAT TRANSFER CORRELATION FOR NOSETIPS WITH STAGNATION-POINT GAS INJECTION

by

Juin S. Yu

ABSTRACT

The test-inferred local heat transfer coefficient distributions over the surfaces of the BMO/Martin nosetip models at zero angle of attack have been correlated from the viewpoint of an attached stable turbulent boundary layer flow. Data included for correlation are obtained from the original data set after screening by using the tabulated heat transfer correlation coefficients. The correlation parameters are determined by applying the method of least squares. A total of twelve runs have been correlated covering injection rates corresponding to p_c/p_{t2}=1, 1.5, 2, 3. A reference flat plate boundary layer indicative of the local flow conditions is introduced and the boundary layer is projected to begin at a location on the surface having an axial distance x_o. Primary results show that $h/h_{fp} = \delta_{fp}/\delta \approx 1.3$ and that x_o increases slightly with increasing injection rates.

The method has so far proved to be reasonably effective. Implementation of the procedure tc other test runs and follow-on work for better understanding the related processes are suggested.

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